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RECREATION RESEARCH PROGRAM

RRP

RECREATION CARRYING CAPACITY FACTS AND CONSIDERATIONS

Report 4

LAKE OUACHITA PROJECT AREA

by

Urban Research and Development Corporation
528 North New Street
Bethlehem, Pa. 18018

LEVEL II

MISCELLANEOUS PAPER R-80-1 JULY 1980 REPORT 4 OF A SERIES

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RECREATION CARRYING CAPACITY FACTS AND CONSIDERATIONS

Title	Date
Report 1: Barkley Lock and Dam, Lake Barkley Project Area	Jul 1980
Report 2: Benbrook Lake Project Area	Jul 1980
Report 3: Hartwell Lake Project Area	Jul 1980
Report 4: Lake Ouachita Project Area	Jul 1980
Report 5: Lake Shelbyville Project Area	Jul 1980
Report 6: McNary Lock and Dam, Lake Wallula Project Area	Jul 1980
Report 7: Milford Lake Project Area	Jul 1980
Report 8: New Hogan Lake Project Area	Jul 1980
Report 9: Shenango River Lake Project Area	Jul 1980
Report 10: Somerville Lake Project Area	Jul 1980
Report 11: Surry Mountain Lake Project Area	Jul 1980

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We gratefully acknowledge the enthusiasm and excellent cooperation of the resource managers, rangers, and other Corps personnel at Lake Ouachita and the representatives from the Vicksburg District Office. Their contribution of practical experience and knowledge, along with their assistance in arranging schedules, have made this carrying capacity research effort possible.

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A project map of Lake Ouachita is enclosed in an envelope attached inside the back cover of this report.

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Recreation carrying capacity	Factors	Overuse
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Social capacity	Monitoring	Underuse
Activity area	Overcrowding	Well-balanced use

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report provides selected recreation carrying capacity-related information for the Lake Ouachita Project. The information is based upon: 1) user and management surveys conducted at Lake Ouachita, and Urban Research and Development Corporation's observations and perceptions of the situations at the project's activity areas. The report provides information regarding activity situations, user characteristics, carrying capacity findings, and other findings; it then focuses on selected problem situations and their possible solutions.

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PREFACE

This report presents the findings and recommendations of the Urban Research and Development Corporation (URDC) relative to recreational carrying capacity at the Lake Ouachita Project Area. Results of site analyses and user surveys are presented as they relate to existing carrying capacity conditions on the project. The study was conducted under Contract with the U. S. Army Engineer Waterways Experiment Station (WES), Vicksburg, Mississippi, (Contract No. DACW39-78-C-0096).

Mr. Donald R. Detwiler, President of URDC, was Principal-In-Charge of this study, assisted by Mr. Martin C. Gilchrist, Executive Vice-President and Mr. David H. Humphrey, Vice-President. Mr. B. Thomas Palmer, Project Director, had the major responsibility for technical project direction; Messrs. Phillip D. Hunsberger and Paul L. Sabrosky were involved in the site analysis, conducting surveys, and the success analysis; and Mr. Timothy A. Fluck was involved in conducting surveys, survey analysis, and development of methodologies.

Mr. R. Scott Jackson, WES was the Project Monitor. Dr. Adolph Anderson, WES, was Program Manager of the Environmental Laboratory (EL) Recreation Research Program. The study was supervised by Dr. Conrad J. Kirby, Chief, Environmental Resources Division, EL, under the general supervision of Dr. John Harrison, Chief, EL.

COL John L. Cannon, CE, and COL Nelson P. Conover, CE, were Commanders and Directors of WES during this study. Technical Director was Mr. F. R. Brown.

CONTENTS

CONVERSION FACTORS, U. S. CUSTOMARY TO METRIC (SI)
UNITS OF MEASUREMENT

U. S. customary units of measurement used in this report can be converted to metric (SI) units as follows.

Multiply	By	To Obtain
acres	4046.856	square metres
Fahrenheit degrees	5/9	Celsuis degrees or Kelvins
feet	0.3048	metres
horsepower (550 foot and pounds per second)	745.6999	watts
inches	2.54	centimetres
miles per hour (U. S. statute)	1.609344	kilometres per hour
miles (U. S. statute)	1.609344	kilometres
square feet	0.09290304	square metres
yards	0.9144	metres

* To obtain Celsius (C) temperature readings from Fahrenheit (F) readings, use the following formula: C = (5/9) (F - 32). To obtain Kelvin (K) readings, use K = (5/9) (F - 32) + 273.15.

PART 1: INTRODUCTION

RECREATION CARRYING CAPACITY FACTS AND CONSIDERATIONS

LAKE OUACHITA PROJECT AREA

PART 1: INTRODUCTION

This Report

Purpose

This report, prepared as the fourth in a series of the U. S. Army Engineer Waterways Experiment Station's (WES) Recreational Carrying Capacity Design and Management Study reports, provides selected carrying capacity-related information for the Lake Ouachita Project Area which cannot be found in the Technical Report. The information is based upon: 1) the user and management surveys conducted at Lake Ouachita, and 2) Urban Research & Development Corporation's (URDC) observations and perceptions of the situations at the project's study activity areas. Some observations and suggestions dealing with project area planning, design, and/or management are included, even though they are not specifically carrying capacity related. The report also suggests specific solutions and treatments of specific recreation activity areas.

The report first provides information regarding activity situations, user characteristics, carrying capacity findings, and other findings; it then focuses on selected problem situations and their possible solutions. Although suggestions regarding possible solutions to problems are included, this report is not intended to be a substitute for master planning or to provide answers to all project area capacity problems. Instead, this report should be viewed as a constructive, informative document which points out directions and techniques for consideration by project managers and designers in the near or distant future.

Relationship to Technical
Report and Handbook

In addition to this Project Area Report and similar reports on the other ten study project areas,* the overall capacity study effort produced a Technical Report and a Capacity Handbook:

a. The Technical Report describes the overall study process, reports detailed study findings, and suggests and demonstrates methods and techniques for capacity management.

b. The Capacity Handbook is a more graphic, "how-to-do-it" type of report, designed to serve as a useful field tool for determining carrying capacity and applying techniques for capacity design and management.

This project area report is different from the Technical Report and Handbook in several ways: it includes information not found in the Technical Report and Capacity Handbook; it reports and examines user survey information by activity area and project area, rather than from the total survey population; it addresses specific problems and examines possible solutions; and it does not include the methodologies for determining and monitoring social and resource capacity. For these reasons, this report is intended to compliment the Technical Report and the Handbook, and is not intended to substitute for them.

Qualifications

The information in this report is based on the Management/Site Survey conducted on November 15-17, 1978 and the User Survey conducted on June 15-17, 1979 by Urban Research and Development Corporation (URDC). (See Appendix B.) The user survey information was collected over a one-weekend period, which may or may not have been representative of a typical or heavy use weekend at Ouachita. Interviews were limited at some activity areas because of such factors as lack of users and weather conditions. For these reasons and because carrying capacity analysis is dynamic rather than static, this report is not intended to provide the final answers. Rather, it is a foundation for future analysis and carrying capacity progress.

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* See definition of "Study Project Area" in Appendix A for a listing of these project areas.

Summary Project Area Description*

Blakely Mountain Dam and Reservoir** was authorized for the purposes of flood control and hydroelectric power generation. Lake Ouachita is located in west central Arkansas, 13 miles§ northwest of Hot Springs and 60 miles southwest of Little Rock. Approximately 2.8 million persons live within 150 miles of the lake. The total project area is 82,373 acres with a lake surface area of 40,060 acres, a lake shoreline of 690 miles, and a land area of 48,300 acres when the lake is at the average recreational pool elevation of 578 feet msl. The steep sloped and heavily wooded landscape distinguishes Lake Ouachita from many other projects visited. Normal summer temperatures are in the middle 80's (degrees F.) with extremes to 100 degrees F., and the average annual precipitation consists of 48 inches of rain and two inches of snow.

Access to the more developed southern portions of the lake is provided by state and county roads leading from U.S. 270. State roads provide access to the northern and western shores. The eastern shore is accessible at two locations (the damsite and at Ouachita State Park) via state roads. The travel distances of the Corps recreation areas from the primary highway vary from two to seven miles. In 1978, attendance reached almost three million recreation days.

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* Appendix C contains a more detailed project area description for your future use.

** See map inside back cover.

§ A table of factors for converting U. S. Customary units of measurement to metric (SI) units is found on page iv.

PART 2: SURVEY FINDINGS BY ACTIVITY

CAMPING

Orientation

The campgrounds at Ouachita provide opportunities for walk-in tent camping and trailer camping. Camping is permitted only at designated sites and each campsite may have no more than two camping units (e.g. trailer, tent, etc.). Most of the campgrounds visited provide 60 to 80 sites and contain overflow areas, registration stations, dump stations, and nearby boat launching facilities. No individual electric or water hook-ups are provided at the Corps campsites. Most campsites enjoy easy access to the lake. Camping on islands is popular.

The remaining findings of this section are based on the User Survey. The User Survey at Ouachita obtained 80 responses from campers at Brady Mountain, Crystal Springs, and Joplin campgrounds.

User characteristics

Table 1 indicates the characteristics of the campers surveyed at Ouachita. The most significant differences in the characteristics of the campers surveyed at Ouachita from those of other study project areas are: 1) the relatively few campers from nearby areas, and 2) the relatively large number of tent campers.

Table 1

Camper Characteristics

Age	Percent of Campers
<18	3
18 - 25	16
26 - 40	46
41 - 55	20
56 - 65	11
>65	4

Group Size	Percent of Campers
1	0
2	17**
3 - 4	49
5 - 8	27
9 - 12	6
>12	1

Travel Time to Project Area	Percent of Campers
<15 minutes	0
15 - 30 minutes	7**
30 - 60 minutes	11**
1 - 2 hours	34
2 - 3 hours	21
3 - 5 hours	13
>5 hours	13

Visit Duration	Percent of Campers
1 - 4 hours	0
5 - 8 hours	0
1 day	6
2 days	28
3 days	10
4 days	17
5 - 7 days	17
>7 days	21

No. of Other Activities	Percent of Campers
0	4
1	6
2	11
3	14
4	20
5	24
6	11
>6	8

Equipment	Percent of Campers
Tent	40*
Tent Camper	15
Truck-Mounted Camper	13
Travel Trailer	30
Van	1
Motor Home	1

*Significantly higher than total survey sample.
**Significantly lower than total survey sample.

User opinions

Spacing preferences - Tables 2 and 3 indicate the spacing (as measured on center of each site) that campers surveyed at Ouachita and elsewhere prefer.

Table 2

Preferred Distance Responses* - Camping

Sample	Sample Size	Range	Mean	Median	Mode
All Campers Surveyed (11 projects)	511	10 - a	79	60	75
Ouachita	55	35 - a	74	60	60
Brady Mountain	26	35 - 100	66	70	70
Crystal Springs	19	40 - a	65	60	60
Joplin	10	35 - 300	123	80	--

*in feet; See Appendix A for definitions of terms.
a - response of "alone" or "out of sight."

Table 3

Preferred Distance Responses in Planning Range and Preference Groupings*

Sample	% in Planning Range[1] (20'-120')	% in A[2] (20'-39')	% in B[2] (40'-59')	% in C[2] (60'-79')	% in D[2] (80'-120')
All Campers Surveyed	90%	20%	28%	31%	21%
Ouachita	94	4	29	39	37
Brady Mountain	100	4	27	50	19
Crystal Springs	89	0	35	41	24
Joplin	80	13	25	0	63

*See Appendix A for definitions of terms; See Technical Report for full development of spacing preference information.
[1]Percentage of all preferred distance responses.
[2]Percentage of all preferred distance responses within the Planning Range.

While the preferences of campers at the three areas differ from each other, the preferences of campers at Joplin are significantly different from those at Brady and Crystal Springs. Spacing in the range of group A (20-39 feet) is greatly disfavored at all three Ouachita activity areas.

Reasons for pleasant/unpleasant experience - Tables 4, 5, and 6 indicate the impact that different factors had on making the camping experience pleasant or unpleasant for users surveyed at the three camping areas surveyed. The responses of the campers surveyed vary greatly from one campground to another. Campers at Brady found their experience to be generally the most pleasant, followed by those at Joplin, and finally those at Crystal Springs. The enforcement of rules and regulations, car parking facilities, and the steepness of slopes were the factors which most often made the experience at Crystal Springs unpleasant. The steepness of slopes, lack of visual privacy, distance from others, and noise were the factors which most often made the experience at Joplin unpleasant.

Table 7 shows the number and percent of campers that indicated they would not return to the activity areas and lists their reasons for not wanting to return.

Tables 8 and 9 indicate the positive and negative changes that campers reported in the physical condition and people's use of the three study camping areas from their previous visit.

Table 4

Reasons Making Recreation Experience Pleasant or Unpleasant--Camping
Brady Mountain Camping Area

Reasons	Percentage* of Users Responding:		
	Pleasant	Unpleasant	Not Important
General Reasons			
Characteristics and behavior of other people	89	11	-
Distance from other people	93	7	-
Number of people in other visitor groups	96	-	4
Number and type of other activities occurring here	100	-	-
Fees charged	89	7	4
Scenic views	100	-	-
Noise	85	15	-
Accidents or near accidents	96	4	-
Enforcement of rules/regulations	70	30	-
Car parking facilities	78	22	-
Theft	100	-	-
Vandalism	100	-	-
Land-Based Reasons			
Visual privacy from other people	100	-	-
Amount of facilities (restrooms, water, etc.)	89	11	-
Convenience to facilities (restrooms, water, etc.)	93	7	-
Nearness to the water body	100	-	-
Steepness of slopes	93	7	-
Maintenance of facilities	89	11	-
Condition of trees and landscape	93	7	-
Condition of grass or soil	93	7	-
Water-Based Reasons			
Water quality	100	-	-

*Percentages may not total 100% because of those responding "Does Not Apply."

Table 5

Reasons Making Recreation Experience Pleasant or Unpleasant--Camping
Crystal Springs Camping Area

Reasons	Percentage* of Users Responding:		
	Pleasant	Unpleasant	Not Important
General Reasons			
Characteristics and behavior of other people	68	21	11
Distance from other people	79	11	11
Number of people in other visitor groups	53	5	37
Number and type of other activities occurring here	74	5	16
Fees charged	68	21	11
Scenic views	100	-	-
Noise	42	47	2
Accidents or near accidents	53	11	11
Enforcement of rules/regulations	63	21	11
Car parking facilities	79	21	-
Theft	63	5	5
Vandalism	63	11	5
Land-Based Reasons			
Visual privacy from other people	63	26	11
Amount of facilities (restrooms, water, etc.)	95	5	-
Convenience to facilities (restrooms, water, etc.)	84	11	5
Nearness to the water body	100	-	-
Steepness of slopes	68	16	16
Maintenance of facilities	100	-	-
Condition of trees and landscape	95	5	-
Condition of grass or soil	95	5	-
Water-Based Reasons			
Water quality	100	-	-

*Percentages may not total 100% because of those responding "Does Not Apply."

Table 6

Reasons Making Recreation Experience Pleasant or Unpleasant--Camping
Joplin Camping Area

Reasons	Percentage* of Users Responding:		
	Pleasant	Unpleasant	Not Important
General Reasons			
Characteristics and behavior of other people	100	-	-
Distance from other people	69	31	-
Number of people in other visitor groups	58	4	38
Number and type of other activities occurring here	78	9	13
Fees charged	92	-	8
Scenic views	100	-	-
Noise	58	21	13
Accidents or near accidents	79	8	-
Enforcement of rules/regulations	100	-	-
Car parking facilities	70	30	-
Theft	90	-	-
Vandalism	90	-	-
Land-Based Reasons			
Visual privacy from other people	60	35	5
Amount of facilities (restrooms, water, etc.)	100	-	-
Convenience to facilities (restrooms, water, etc.)	92	4	4
Nearness to the water body	100	-	-
Steepness of slopes	63	37	-
Maintenance of facilities	100	-	-
Condition of trees and landscape	95	5	-
Condition of grass or soil	95	5	-
Water-Based Reasons			
Water quality	100	-	-

*Percentages may not total 100% because of those responding "Does Not Apply."

Table 7

Number and Percent of Users That Indicated They Would Not Return to the Activity Area and Their Reasons

Area	Number and percent of users surveyed who indicated they would not return #	%	Reasons for not wanting to return
Brady Mt.	0	0	(None mentioned)
Crystal Springs	3	16%	"Noise - partying all night in overflow area" "Lack of enforcement of rules" "Faucet connector - no provision for screwing on a hose for camper water supply"
Joplin	1	5%	"Sites too close" "No privacy" "Grass/soil in bad condition"

Table 8

Positive and Negative Changes Noticed in the People's Use of the Area - Items Mentioned by Campers

Area	Positive Changes		Negative Changes	
Brady Mt.	(None mentioned)		"More rowdier"	(1)
Crystal Springs	"Quieter"	(1)	"Crowded"	(1)
	"Less crowded"	(1)	"Noisier"	(1)
	"More people"	(1)	"Parking in areas they shouldn't be"	(1)
			"Lawlessness"	(1)
			"Minor vandalism and thievery"	(1)
Joplin	"More campers, fewer tents"	(1)	"Overcrowded"	(3)
			"Game Warden"	(1)
			"Too many cars"	(1)
			"Generators on motor homes"	(1)

NOTE: The number in parenthesis (#) indicates the number of times the change was mentioned.

Table 9

Positive and Negative Changes Noticed in the Physical Conditions of the Area - Items Mentioned by Campers

Area	Positive Changes	Negative Changes
Brady Mt.	"Fewer sites" (4)	"Fewer sites" (3)
	"Bathrooms & showers" (4)	"Have to park on pads" (2)
	"Cleaner/better maintenance" (4)	"Roads in worse condition" (2)
	"Paved roads" (4)	"Walk-in area should have been left as a road" (2)
	"Reseeding" (3)	"Paved pads for tenters" (1)
	"Separate tent camping areas" (3)	
	"More distance between sites" (2)	
	"Designated sites" (2)	
	"Better roads" (1)	
Crystal Springs	"Bathrooms and facilities" (5)	"Best sites for tenting only" (1)
	"Leveling of sites" (1)	
Joplin	"New bathroom facilities" (7)	"Need more garbage cans (trash)" (4)
	"Clean area" (3)	"Wear and tear" (1)
	"Maintenance" (2)	"Noise of sewage pump" (1)
	"Electric, hot and cold water" (1)	"Designated tent areas" (1)
	"Paved road" (1)	"Too many sites removed" (1)
		"Condition of road" (1)

NOTE: The number in parenthesis (#) indicates times change was mentioned.

Acceptability of techniques - Table 10 indicates the acceptability of different techniques for solving problems to the campers surveyed at Ouachita.

The acceptability of most techniques is very clear: at least 60 percent of the respondents agreed on one of the 3 levels of acceptability for 14 of the 22 techniques. But even for those techniques which most respondents found to be acceptable, up to 46 percent found them to be unacceptable. Thus, project management should expect some opposition to any technique used.

In general, the more apparent and widespread that a problem of overcrowding or overuse is, the more likely users may accept a technique which addresses it. Thus, remedial techniques (which solve existing problems) are generally more acceptable than preventative techniques (which correct a problem before it becomes readily apparent).

The more users can understand the rationale and operation of a technique, the more likely they will accept the use of the technique. Education, therefore, would seem to be an important method of improving user acceptance of different techniques.

It also seems as though the more directly a technique impacts only the problem, and the less it operates to diminish recreational opportunities generally, the more likely users will accept the use of the technique. Thus, techniques which can be applied in the short-term or selectively to problem areas are favored (particularly if done in a crisis setting).

Techniques which call for reductions in existing opportunities to use recreational resources and facilities are strongly disfavored. User expectations of the opportunities available are critical in this determination. Consideration should be given initially to avoiding overdeveloping an area with the idea that selective cutbacks in services and facilities can be accomplished later. Users expectations will be based on the initial level, and subsequent reductions will be disfavored.

Table 10

User Acceptability of Techniques--Camping

Lake Ouachita

Techniques	Levels of Acceptability Percentage* of Users Responding: Very Acceptable	Mildly Acceptable	Unacceptable
General Planning Techniques			
Keep major recreation areas more separated	51	19	26
Make vehicle access to areas less convenient	15	13	72
Make area's existence less obvious	13	9	78
Site Planning Techniques			
Redesign area to accommodate fewer users	61	21	16
Design for greater distance between people	62	24	13
Reduce number of parking spaces	33	16	49
Change natural surface by hardening	25	12	63
Change natural surface by paving	44	30	26
Provide landscaped buffers	44	24	31
Management Techniques			
Procedures:			
Require prior reservations	15	18	67
Require permits	4	17	79
Charge/increase fees	10	23	66
Rules and Regulations:			
Impose more rules	13	9	79
Provide stricter enforcement of rules	39	16	46
Close areas when natural resource destruction reaches critical point	84	7	9
Close areas when they become "too full"	84	7	9
Reduce number of activities in same area	37	19	37
Limit number of people in visitor groups	23	19	54
Keep unnecessary vehicles out	70	11	19
Services:			
Provide more and better information	55	29	10
Increase maintenance and restoration	71	20	7
Reduce facilities and services	3	6	91

*Percentages may not total 100% because of those responding "Does Not Apply."

BOATING/WATERSKIING

Orientation

Boating and waterskiing are both popular activities at Lake Ouachita. Although overcrowding is not a problem across the entire lake surface, nodal crowding sometimes occurs. Heavy use areas include the cove areas and the other water areas adjacent to the ramps, camping areas, and marinas. There is no zoning on the lake per se, but "no wake" and "no ski areas" exist. Like most Corps project areas, conflicts exist between boaters and boat fishermen.

The remainder of the findings in this section are based on the User Survey. This survey obtained 30 responses from boaters and waterskiers, who were surveyed predominantly at Brady Mountain, Crystal Springs and Joplin areas.

User characteristics

Table 11 indicates the characteristics of the boaters and waterskiers surveyed at Ouachita. The most significant differences in the characteristics of the boaters and waterskiers who were surveyed at Ouachita from those of other project areas are: 1) the relatively fewer users from nearby areas, and 2) the relatively fewer number of users participating in no or in only one other activity.

Table 11

Boater/Waterskier Characteristics

Age	Percent of Boaters/Waterskiers	Group Size	Percent of Boaters/Waterskiers
<18	7	1	0
18 - 25	37	2	20
26 - 40	27	3 - 4	47
41 - 55	30	5 - 8	27
56 - 65	0	9 - 12	3
>65	0	>12	3

Travel Time to Project Area	Percent of Boaters/Waterskiers	Visit Duration	Percent of Boaters/Waterskiers
<15 minutes	3**	1 - 4 hours	13
15 - 30 minutes	7**	5 - 8 hours	20
30 - 60 minutes	10**	1 day	13
1 - 2 hours	43	2 days	27
2 - 3 hours	23	3 days	17
3 - 5 hours	10	4 days	3
>5 hours	3	5 - 7 days	7
		>7 days	0

No. of Other Activities	Percent of Boaters/Waterskiers	Equipment	Percent of Boaters/Waterskiers
0	3**	Day sailer	0
1	10**	Sailer (cabin)	0
2	7	Canoe	0
3	23	Row boat	0
4	17	Power boat	
5	23	(<25 h.p.)	0
6	10	Power boat	
>6	6	(>25 h.p.)	100
		Houseboat or cruiser	0

**Significantly lower than total survey sample.

User opinions

Spacing preferences - Tables 12 and 13 indicate the spacing that the boaters and waterskiers surveyed at Ouachita and elsewhere prefer.

Table 12

Preferred Distance Responses*

Sample	Sample Size	Range	Mean	Median	Mode
All Boaters Surveyed	135	30- a	531	300	300
Ouachita	15	100-2640	618	150	-
All Waterskiers Surveyed	95	30- a	520	300	300
Ouachita	15	50-2640	546	300	600

*In feet; see Appendix A for definitions of terms.

a - response of "alone" or "out of sight."

Table 13

Preferred Distance Responses in Planning Range and Preference Groupings*

Sample	% in Planning Range[1] (100'-1500')	% in A[2] (100'-199')	% in B[2] (200'-450')	% in C[2] (451'-1500')
All Boaters Surveyed	79%	29%	37%	34%
Ouachita	80	50	0	50
Sample	**% in Planning Range[1] (100'-1500')**	**% in A[2] (100'-199')**	**% in B[2] (200'-400')**	**% in C[2] (401'-1500')**
All Waterskiers Surveyed	91%	22%	50%	28%
Ouachita	87	8	46	46

*See Appendix A for definitions of terms; see Technical Report for a full development of spacing preference information.

[1]Percentage of all preferred distance responses.

[2]Percentage of all preferred distance responses in the Planning Range.

Reasons for pleasant/unpleasant experience - Table 14 indicates the impact that different factors had on making the boating or waterskiing experience pleasant or unpleasant for the users surveyed at Ouachita. Users found their experience to be generally pleasant. The amount of car parking facilities was the factor which was most frequently unpleasant. No factor was unpleasant enough to cause the boaters and waterskiers surveyed to indicate they would not return.

Tables 15 and 16 indicate the positive and negative changes that boaters/waterskiers reported in the physical condition and people's use of the area from their previous visit.

Table 15

Positive and Negative Changes Noticed in the Physical Conditions of the Area - Items Mentioned by Boaters/Waterskiers

Area	Positive Changes	Negative Changes
Lake (or adjacent areas)	"Cleaner" (2) "New bathrooms" (1) "Everything better" (1)	"People park cars in center of ramp" (2) "Need more picnic tables" (1)

NOTE: The number in parenthesis (#) indicates the number of times the change was mentioned.

Table 16

Positive and Negative Changes Noticed in the People's Use of the Area - Items Mentioned by Boaters/Waterskiers

Area	Positive Changes	Negative Changes
Lake	"Less crowded" (1) "More sailboats" (1)	"Day users not always stay for just a day" (1) "Rangers too strict" (1) "More people" (1)

NOTE: The number in parenthesis (#) indicates the number of times the change was mentioned.

Table 14

Reasons Making Recreation Experience Pleasant or Unpleasant--Boating/Waterskiing
Lake Ouachita

Reasons	Percentage* of Users Responding:		
	Pleasant	Unpleasant	Not Important
General Reasons			
Characteristics and behavior of other people	97	3	-
Distance from other people	90	3	7
Number of people in other visitor groups	83	7	10
Number and type of other activities occurring here	83	-	17
Scenic views	97	-	3
Noise	80	-	10
Accidents or near accidents	93	7	-
Enforcement of rules/regulations	90	10	-
Car parking facilities	50	47	3
Theft	93	3	3
Vandalism	93	3	3
Land-Based Reasons			
Amount of facilities (restrooms, water, etc.)	87	10	-
Convenience to facilities (restrooms, water, etc.)	90	7	3
Maintenance of facilities	97	-	3
Condition of trees and landscape	73	-	-
Condition of grass or soil	73	-	-
Water-Based Reasons			
Water quality	100	-	-
Formal designation of places for your activity	62	-	3
Waiting time to launch boat	97	-	-
People in areas they shouldn't be	90	3	-

*Percentages may not total 100% because of those responding "Does Not Apply."

Acceptability of techniques - Table 17 indicates the acceptability of different techniques for solving problems to the boaters and water-skiers surveyed at Ouachita.

The acceptability of most techniques is very clear: at least 60 percent of the respondents agreed on one of the 3 levels of acceptability for 12 of the 17 techniques. But even for those techniques which most respondents found to be acceptable, up to 47 percent found them to be unacceptable. Thus, project management should expect some opposition to any technique used.

Table 17

User Acceptability of Techniques--Boating/Waterskiing
Lake Ouachita

Techniques	Levels of Acceptability Percentage* of Users Responding:		
	Very Acceptable	Mildly Acceptable	Unacceptable
General Planning Techniques			
Keep major recreation areas more separated	27	37	37
Make vehicle access to areas less convenient	10	30	60
Make area's existence less obvious	3	30	67
Site Planning Techniques			
Design for greater distance between people	17	40	13
Reduce number of parking spaces	37	17	47
Management Techniques			
Procedures:			
Require prior reservations	7	30	63
Require permits	8	14	78
Charge/increase fees	3	47	50
Rules and Regulations:			
Impose more rules	13	3	83
Provide stricter enforcement of rules	23	17	60
Close areas when natural resource destruction reaches critical point	78	14	8
Close areas when they become "too full"	65	28	7
Reduce number of activities in same area	24	34	41
Keep unnecessary vehicles out	63	25	6
Services:			
Provide more and better information	63	27	10
Increase maintenance and restoration	60	30	7
Reduce facilities and services	3	10	87

*Percentages may not total 100% because of those responding "Does Not Apply."

SUNBATHING/SWIMMING

Orientation

Some camping and day-use conflicts occur because of the location of sunbathing/swimming areas (i.e., at Brady Mountain and Crystal Springs). Separate swimming beach areas are currently being planned and designed for both campers and day users. Overuse has been a problem at Crystal Springs. In the past, beaches have been maintained and the sand replenished to solve overuse. Crystal Springs, Joplin, and Brady Mountain are popular and receive very heavy use.

The remainder of the findings of this section are based on the User Survey. This survey obtained 41 responses from sunbathers and swimmers at Brady Mountain, Crystal Springs, and Joplin recreation areas.

User characteristics

Table 18 indicates the characteristics of the sunbathers and swimmers surveyed at Ouachita. The only significant difference in the characteristics of the sunbathers and swimmers surveyed at Ouachita from those of other study project areas are in travel time.

Table 18

Sunbather/Swimmer Characteristics

Age	Percent of Sunbathers/Swimmers
<18	12
18 - 25	33
26 - 40	38
41 - 55	12
56 - 65	0
>65	2

Group Size	Percent of Sunbathers/Swimmers
1	0
2	48
3 - 4	36
5 - 8	14
9 - 12	0
>12	0

Travel Time to Project Area	Percent of Sunbathers/Swimmers
<15 minutes	0**
15 - 30 minutes	17**
30 - 60 minutes	36*
1 - 2 hours	21*
2 - 3 hours	12*
3 - 5 hours	12*
>5 hours	0

Visit Duration	Percent of Sunbathers/Swimmers
1 - 4 hours	51
5 - 8 hours	15
1 day	17
2 days	10
3 days	2
4 days	2
5 - 7 days	2
>7 days	0

No. of Other Activities	Percent of Sunbathers/Swimmers
0	5
1	55
2	24
3	5
4	2
5	5
6	5
>6	0

*Significantly higher than total survey sample.
**Significantly lower than total survey sample.

User opinions

Spacing preferences - Tables 19 and 20 indicate the spacing that sunbathers and swimmers surveyed at Ouachita and elsewhere prefer.

Table 19

Preferred Distance Responses*

Sample	Sample Size	Range	Mean	Median	Mode
All Sunbathers surveyed	161	3- a	30	20	15, 20
Ouachita	23	5- 50	17	15	10, 15
Brady Mountain	11	15- 50	23	20	15
Crystal Springs	11	5- 20	12	10	10
Joplin	1	10	10	10	10
All Swimmers surveyed	120	2-200	25	20	20
Ouachita	13	5- 50	21	18	10
Brady Mountain	2	20- 50	35	20	-
Crystal Springs	9	5- 50	20	18	10
Joplin	2	10- 12	11	10	-

*In feet; See Appendix A for definitions of terms.
a - response of "alone" or "out of sight."

Table 20

Preferred Distance Responses in Planning Range and Preference Groupings*

Sample	% in Planning Range[1](5'-50')	% in A[2] (5'-14')	% in B[2] (15'-20')	% in C[2] (21'-30')	% in D[2] (31'-50')
All Sunbathers surveyed	88%	27%	39%	20%	14%
Ouachita	100	39	44	9	9
Brady Mt.	100	0	64	18	18
Crystal Springs	100	73	27	0	0
Joplin	100	100	0	0	0
Sample	**% in Planning Range[1](5'-50')**	**% in A[2] (5'-14')**	**% in B[2] (15'-24')**	**% in C[2] (25'-34')**	**% in D[2] (35'-50')**
All Swimmers surveyed	90%	25%	41%	19%	15%
Ouachita	100	46	31	0	23
Brady Mt.	100	0	50	0	50
Crystal Springs	100	44	33	0	22
Joplin	100	100	0	0	0

*See Appendix A for definitions of terms; See Technical Report for a full development of spacing preference information.
[1]Percentage of all preferred distance responses.
[2]Percentage of all preferred distance responses in Planning Range.

Most of the differences between the percentages for the different activity areas can most likely be attributed to the small sample sizes for sunbathing at Joplin and for swimming at Brady Mountain and Joplin. In general, the sunbathers and swimmers surveyed at Ouachita preferred somewhat closer spacing than those surveyed at other project areas.

Reasons for pleasant/unpleasant experience - Tables 21, 22, and 23 indicate the impact that different factors had on making the experience of the sunbathers and swimmers surveyed pleasant or unpleasant at the three areas. The responses vary greatly from one area to another.

Sunbathers and swimmers at Brady Mountain generally found their experience to be pleasant, with only the condition of the grass or soil causing unpleasantness in a significant number of cases.

Sunbathers and swimmers at Joplin also generally found their experience to be pleasant, with only the amount of parking facilities causing unpleasantness in a significant number of cases.

However, sunbathers and swimmers at Crystal Springs found their experience to be more frequently unpleasant than those at the other two areas. Car parking facilities, crowding and noise were the major unpleasant factors, but all the factors seemed unpleasant to at least one user.

Table 24 shows the number and percentage of sunbathers/swimmers that indicated they would not return to the activity area and their reasons.

Table 25 indicates the positive and negative changes that sunbathers/swimmers reported on the physical condition of the three areas surveyed from the previous visit (no changes were reported regarding people's use of the areas).

Table 21

Reasons Making Recreation Experience Pleasant or Unpleasant--Sunbathing/Swimming
Brady Mountain

Reasons	Percentage* of Users Responding:		
	Pleasant	Unpleasant	Not Important
General Reasons Characteristics and behavior of other people	100	-	-
Distance from other people	92	8	-
Number of people in other visitor groups	100	-	-
Number and type of other activities occurring here	100	-	-
Scenic views	100	-	-
Noise	100	-	-
Accidents or near accidents	92	8	-
Enforcement of rules/regulations	100	-	-
Car parking facilities	100	-	-
Theft	100	-	-
Vandalism	100	-	-
Land-Based Reasons Amount of facilities (restrooms, water, etc.)	100	-	-
Convenience to facilities (restrooms, water, etc.)	100	-	-
Maintenance of facilities	100	-	-
Condition of trees and landscape	100	-	-
Condition of grass or soil	83	17	-
Water-Based Reasons Water quality	100	-	-
Formal designation of places for your activity	38	-	-
People in areas they shouldn't be	100	-	-

*Percentages may not total 100% because of those responding "Does Not Apply."

Table 22

Reasons Making Recreation Experience Pleasant or Unpleasant--Sunbathing/Swimming
Crystal Springs

Reasons	Percentage* of Users Responding:		
	Pleasant	Unpleasant	Not Important
General Reasons			
Characteristics and behavior of other people	88	4	8
Distance from other people	56	40	4
Number of people in other visitor groups	76	8	16
Number and type of other activities occurring here	72	12	16
Scenic views	100	-	-
Noise	56	36	8
Accidents or near accidents	64	8	12
Enforcement of rules/regulations	76	4	8
Car parking facilities	44	56	-
Theft	68	4	28
Vandalism	68	4	28
Land-Based Reasons			
Amount of facilities (restrooms, water, etc.)	100	-	-
Convenience to facilities (restrooms, water, etc.)	96	4	-
Maintenance of facilities	100	-	-
Condition of trees and landscape	92	8	-
Condition of grass or soil	88	12	-
Water-Based Reasons			
Water quality	88	12	-
Formal designation of places for your activity	86	5	9
People in areas they shouldn't be	72	4	20

*Percentages may not total 100% because of those responding "Does Not Apply."

Table 23

Reasons Making Recreation Experience Pleasant or Unpleasant--Sunbathing/Swimming
Joplin

Reasons	Percentage* of Users Responding:		
	Pleasant	Unpleasant	Not Important
General Reasons Characteristics and behavior of other people	100	-	-
Distance from other people	100	-	-
Number of people in other visitor groups	67	-	33
Number and type of other activities occurring here	33	-	67
Scenic views	100	-	-
Noise	100	-	-
Accidents or near accidents	100	-	-
Enforcement of rules/regulations	100	-	-
Car parking facilities	33	67	-
Theft	100	-	-
Vandalism	100	-	-
Land-Based Reasons Amount of facilities (restrooms, water, etc.)	100	-	-
Convenience to facilities (restrooms, water, etc.)	100	-	-
Maintenance of facilities	100	-	-
Condition of trees and landscape	100	-	-
Condition of grass or soil	100	-	-
Water-Based Reasons Water quality	100	-	-
Formal designation of places for your activity	100	-	-
People in areas they shouldn't be	100	-	-

*Percentages may not total 100% because of those responding "Does Not Apply."

Table 24

Number and Percent of Users That Indicated They Would Not Return to the Activity Area and Their Reasons

Area	Number and percent of users surveyed who indicated they would not return #	%	Reasons for not wanting to return
Brady Mountain	2	15%	"Poor condition of beach"
Crystal Springs	2	8%	"Water quality" "Behavior of people" "Too crowded"
Joplin	0	0	(None mentioned)

Table 25

Positive and Negative Changes Noticed in Physical Conditions of the Area - Items Mentioned by Sunbathers/Swimmers

Area	Positive Changes	Negative Changes
Brady Mountain	(None mentioned)	"Water too high" (4)
		"Very little sand" (2)
		"Big roads" (1)
		"More rocks" (1)
Crystal Springs	(None mentioned)	"Beach eroded" (2)
Joplin	"Beach is nice and sunny" (1)	"Water too high" (1)

NOTE: The number in parenthesis (#) indicates the number of times the change was mentioned.

Acceptability of techniques - Table 26 indicates the acceptability of different techniques for solving problems to the sunbathers and swimmers surveyed at Ouachita.

The acceptability of most techniques is very clear: at least 60 percent of the respondents agreed on one of the 3 levels of acceptability for 10 of the 18 techniques. But even for those techniques which most respondents found to be acceptable, up to 40 percent found them to be unacceptable. Thus, project management should expect some opposition to any technique used.

Table 26

User Acceptability of Techniques--Sunbathing/Swimming
Lake Ouachita

Techniques	Levels of Acceptability		
	Percentage* of Users Responding:		
	Very Acceptable	Mildly Acceptable	Unacceptable
General Planning Techniques			
Keep major recreation areas more separated	30	48	32
Make vehicle access to areas less convenient	13	20	67
Make area's existence less obvious	3	13	85
Site Planning Techniques			
Redesign area to accommodate fewer users	33	34	33
Design for greater distance between people	55	40	5
Reduce number of parking spaces	23	15	62
Management Techniques			
Procedures:			
Require permits	3	13	84
Charge/increase fees	-	23	77
Rules and Regulations:			
Impose more rules	10	27	73
Provide stricter enforcement of rules	43	17	40
Close areas when natural resource destruction reaches critical point	82	13	5
Close areas when they become "too full"	57	38	5
Reduce number of activities in same area	38	27	35
Limit number of people in visitor groups	8	25	67
Keep unnecessary vehicles out	57	13	30
Services:			
Provide more and better information	56	33	8
Increase maintenance and restoration	62	33	5
Reduce facilities and services	3	5	92

*Percentages may not total 100% because of those responding "Does Not Apply."

BOAT LAUNCHING

Orientation

The Crystal Springs, Joplin and Brady Mountain launch ramps are heavily used because of their location. Although the ramps are 6-lanes wide, each lane is not individually marked. Inadequate parking and circulation limits the usefulness of the ramps and sometimes results in overcrowding. Courtesy docks are not provided. In regard to overuse, compaction, erosion, and damage to ground cover is most likely to occur at the shoreline areas between the hardened surfaces (parking and ramp) and the water.

The remainder of the findings in this section are based on the User Survey. This survey obtained 20 responses from boat launchers at the Brady Mountain and Crystal Springs ramps.

User characteristics

Table 27 indicates the characteristics of the boat launchers surveyed at Ouachita.

Table 27

Boat Launcher Characteristics

Age	Percent of Boat Launchers
<18	0
18 - 25	25
26 - 40	40
41 - 55	30
56 - 65	5
>65	0

Group Size	Percent of Boat Launchers
1	10
2	30
3 - 4	50
5 - 8	10
9 - 12	0
>12	0

Travel Time to Project Area	Percent of Boat Launchers
<15 minutes	5
15 - 30 minutes	10
30 - 60 minutes	20
1 - 2 hours	50
2 - 3 hours	5
3 - 5 hours	5
>5 hours	5

Visit Duration	Percent of Boat Launchers
1 - 4 hours	23
5 - 8 hours	35
1 day	17
2 days	5
3 days	10
4 days	0
5 - 7 days	10
>7 days	0

No. of Other Activities	Percent of Boat Launchers
0	25
1	30
2	25
3	0
4	0
5	5
6	0
>6	15

User opinions

Preferred waiting times - The average (preferred) time to launch a boat at the Crystal Springs and Brady Mountain ramps were 6 and 11 minutes, respectively.

Reasons for pleasant/unpleasant experience - Tables 28 and 29 indicate the impact that different factors had on making launching pleasant or unpleasant at the two ramps surveyed. While the percentages of responses differ between the two areas, in most cases these differences are not significant. However, the amount of car parking facilities seemed to have been unpleasant more frequently at Brady Mountain than at Crystal Springs. People being in areas where they shouldn't be (beach users) also caused unpleasantness to boat launchers in a significant number of cases at Brady Mountain. One respondent indicates that he would not return to the Crystal Springs ramp because of the parking problem. Tables 30 and 31 show the positive and negative changes from their previous visit mentioned by the Brady Mt. and Crystal Springs boat launchers.

Table 28

Reasons Making Recreation Experience Pleasant or Unpleasant--Boat Launching
Brady Mountain

Reasons	Percentage* of Users Responding:		
	Pleasant	Unpleasant	Not Important
General Reasons			
Characteristics and behavior of other people	100	-	-
Distance from other people	80	-	-
Number of people in other visitor groups	40	-	40
Number and type of other activities occurring here	60	-	40
Scenic views	40	-	60
Noise	40	-	60
Accidents or near accidents	100	-	-
Enforcement of rules/regulations	100	-	-
Car parking facilities	20	80	-
Theft	100	-	-
Vandalism	100	-	-
Land-Based Reasons			
Amount of facilities (restrooms, water, etc.)	100	-	-
Convenience to facilities (restrooms, water, etc.)	100	-	-
Steepness of slopes	100	-	-
Maintenance of facilities	100	-	-
Condition of trees and landscape	80	-	20
Condition of grass or soil	80	-	20
Water-Based Reasons			
Water quality	100	-	-
Formal designation of places for your activity	40	-	-
Waiting time to launch boat	40	-	-
People in areas they shouldn't be	80	20	-

*Percentages may not total 100% because of those responding "Does Not Apply."

Table 29

Reasons Making Recreation Experience Pleasant or Unpleasant--Boat Launching
Crystal Springs

Reasons	Percentage* of Users Responding:		
	Pleasant	Unpleasant	Not Important
General Reasons			
Characteristics and behavior of other people	93	-	7
Distance from other people	80	-	13
Number of people in other visitor groups	87	-	13
Number and type of other activities occurring here	80	7	7
Scenic views	87	-	13
Noise	93	7	-
Accidents or near accidents	93	-	-
Enforcement of rules/regulations	93	7	-
Car parking facilities	60	40	-
Theft	87	-	7
Vandalism	87	7	-
Land-Based Reasons			
Amount of facilities (restrooms, water, etc.)	93	7	-
Convenience to facilities (restrooms, water, etc.)	100	-	-
Steepness of slopes	60	13	-
Maintenance of facilities	100	-	-
Condition of trees and landscape	100	-	-
Condition of grass or soil	93	-	-
Water-Based Reasons			
Water quality	100	-	-
Formal designation of places for your activity	80	-	-
Waiting time to launch boat	60	-	-
People in areas they shouldn't be	80	-	-

*Percentages may not total 100% because of those responding "Does Not Apply."

Table 30

Positive and Negative Changes Noticed in the Physical Conditions of the Area - Items Mentioned by Boat Launchers

Area	Positive Changes	Negative Changes
Brady Mountain	"Enlarge parking" (1)	(None mentioned)
Crystal Springs	"More parking" (1)	
	"New bathrooms" (1)	
	"New lights" (1)	

NOTE: The number in parenthesis (#) indicates the number of times the change was mentioned.

Table 31

Positive and Negative Changes Noticed in the People's Use of the Area - Items Mentioned by Boat Launchers

Area	Positive Changes	Negative Changes
Brady Mountain	(None mentioned)	(None mentioned)
Crystal Springs	"People are faster" (1)	"Trash" (1)
		"Overcrowded" (1)

NOTE: The number in parenthesis (#) indicates the number of times the change was mentioned.

Acceptability of techniques - Table 32 indicates the acceptability of different techniques for solving problems to the boat launchers surveyed at Ouachita.

The acceptability of most techniques is very clear: at least 60 percent of the respondents agreed on one of the 3 levels of acceptability for 10 of the 19 techniques. But even for those techniques which most respondents found to be acceptable, up to 33 percent found them to be unacceptable. Thus, project management should expect some opposition to any technique used.

Table 32

User Acceptability of Techniques--Boat Launching
Lake Ouachita

Techniques	Levels of Acceptability Percentage* of Users Responding:		
	Very Acceptable	Mildly Acceptable	Unacceptable
General Planning Techniques			
Keep major recreation areas more separated	66	17	17
Make vehicle access to areas less convenient	-	15	85
Make area's existence less obvious	12	23	64
Site Planning Techniques			
Redesign area to accommodate fewer users	12	30	40
Design for greater distance between people	24	28	12
Reduce number of parking spaces	12	30	58
Management Techniques			
Procedures:			
Require prior reservations	12	6	82
Require permits	12	12	76
Charge/increase fees	12	23	65
Rules and Regulations:			
Impose more rules	12	18	69
Provide stricter enforcement of rules	33	28	33
Close areas when natural resource destruction reaches critical point	52	30	18
Close areas when they become "too full"	39	44	18
Reduce number of activities in same area	56	11	27
Limit number of people in visitor groups	-	6	62
Keep unnecessary vehicles out	54	28	18
Services:			
Provide more and better information	75	25	-
Increase maintenance and restoration	55	33	-
Reduce facilities and services	12	6	82

*Percentages may not total 100% because of those responding "Does Not Apply."

PICNICKING

Orientation

Picnickers were interviewed at the spillway area. This day use area is popular undoubtedly because it is located adjacent to an attractive and popular sailboating area and it is comparatively close to the City of Hot Springs. The area has moderately steep slopes and is wooded. Some soils are compacted, but overuse is not a major problem. Many other picnic areas are located at the lake; small picnic areas with only a few tables are provided within some camping areas (e.g., Joplin).

The remainder of the findings made in this section are based on the User Survey. This survey obtained 10 responses from picnickers at the Spillway Day Use Area.

User characteristics

Table 33 indicates the characteristics of the picnickers surveyed at Ouachita. The most significant differences in the characteristics of the picnickers surveyed at Ouachita from those of other study project areas are: 1) the relatively fewer older users, 2) the relatively fewer large groups, 3) the relatively greater number of users from close by locations, and 4) the relatively greater number of users who participate in no other activity or in only 2 other activities.

Table 33

Picnicker Characteristics

Age	Percent of Picnickers	Group Size	Percent of Picnickers
<18	0	1	0
18 - 25	30	2	10
26 - 40	50	3 - 4	60
41 - 55	20	5 - 8	30
56 - 65	0**	9 - 12	0**
>65	0**	>12	0**

Travel Time to Project Area	Percent of Picnickers	Visit Duration	Percent of Picnickers
<15 minutes	40*	1 - 4 hours	30
15 - 30 minutes	50*	5 - 8 hours	70
30 - 60 minutes	10**	1 day	0
1 - 2 hours	0	2 days	0
2 - 3 hours	0	3 days	0
3 - 5 hours	0	4 days	0
>5 hours	0	5 - 7 days	0
		>7 days	0

No. of Other Activities	Percent of Picnickers
0	30*
1	0**
2	70*
3	0**
4	0**
5	0**
6	0
>6	0

*Significantly higher than total survey sample.
**Significantly lower than total survey sample.

User opinions

Spacing preferences - Tables 34 and 35 indicate the spacing that picnickers surveyed at Ouachita and elsewhere prefer.

Table 34

Preferred Distance Responses*

Sample	Sample Size	Range	Mean	Median	Mode
All Picnickers Surveyed	190	1 - a	62	50	50
Ouachita (Spillway)	10	25 - 50	36	40	40

*In feet; See Appendix A for definitions of terms.
a - response of "alone" or "out of sight."

Table 35

Preferred Distance Responses in Planning Range and Preference Groupings*

Sample	% in Planning Range[1] (20'-100')	% in A[2] (20'-39')	% in B[2] (40'-59')	% in C[2] (60'-79')	% in D[2] (80'-100')
All Picnickers surveyed	93%	23%	42%	20%	15%
Ouachita (Spillway)	100	20	80	0	0

*See Appendix A for definitions of terms; See Technical Report for a full development of spacing preference information.

[1]Percentage of all preferred distance responses.
[2]Percentage of all preferred distance responses in the Planning Range.

Reasons for pleasant/unpleasant experience - Table 36 indicates the impact that different factors had on making the picnic experience pleasant or unpleasant for users surveyed at the spillway area. The factors most frequently contributing to an unpleasant experience were convenient to facilities and nearness to the water body, while noise was also a significant contributing factor to unpleasantness. All 10 respondents reported there were no factors unpleasant enough to prevent them from coming back.

Table 36

Reasons Making Recreation Experience Pleasant or Unpleasant--Picnicking Spillway

	Percentages* of Users Responding:		
	Pleasant	Unpleasant	Not Important
General Reasons Characteristics and behavior of other people	100	-	-
Distance from other people	90	10	-
Number of people in other visitor groups	90	10	-
Number and type of other activities occurring here	90	10	-
Scenic views	90	-	10
Noise	80	20	-
Accidents or near accidents	100	-	-
Enforcement of rules/regulations	100	-	-
Car parking facilities	90	10	-
Theft	100	-	-
Vandalism	100	-	-
Land-Based Reasons Visual privacy from other people	90	-	10
Amount of facilities (restrooms, water, etc.)	100	-	-
Convenience to facilities (restrooms, water, etc.)	70	30	-
Nearness to the water body	70	30	-
Steepness of slopes	100	-	-
Maintenance of facilities	90	10	-
Condition of trees and landscape	100	-	-
Condition of grass or soil	100	-	-
Water-Based Reasons Water quality	100	-	-

*Percentages may not total 100% because of those responding "Does Not Apply."

Acceptability of techniques - Table 37 indicates the acceptability of different techniques for solving problems to the picnickers surveyed at Ouachita.

The acceptability of most techniques is very clear: at least 60 percent of the respondents agreed on one of the 3 levels of acceptability for 16 of the 21 techniques. But even for those techniques which most respondents found to be acceptable, up to 40 percent found them to be unacceptable. Thus, project management should expect some opposition to any technique used.

Table 51

User Acceptability of Techniques--Picnicking
Lake Ouachita

Techniques	Levels of Acceptability Percentage* of Users Responding:		
	Very Acceptable	Mildly Acceptable	Unacceptable
General Planning Techniques			
Keep major recreation areas more separated	50	40	10
Make vehicle access to areas less convenient	20	20	60
Make area's existence less obvious	60	30	10
Site Planning Techniques			
Redesign area to accommodate fewer users	10	60	30
Design for greater distance between people	20	60	20
Reduce number of parking spaces	10	80	10
Change natural surface by paving	-	30	70
Provide landscaped buffers	20	60	20
Management Techniques			
Procedures:			
Require prior reservations	-	10	90
Require permits	-	10	90
Charge/increase fees	-	40	60
Rules and Regulations:			
Impose more rules	20	40	40
Provide stricter enforcement of rules	70	20	10
Close areas when natural resource destruction reaches critical point	40	60	-
Close areas when they become "too full"	10	70	20
Reduce number of activities in seam area	10	50	40
Limit number of people in visitor groups	-	50	50
Keep unnecessary vehicles out	90	10	-
Services:			
Provide more and better information	60	20	20
Increase maintenance and restoration	10	70	20
Reduce facilities and services	-	40	60

*Percentages may not total 100% because of those responding "Does Not Apply."

BOAT FISHING

Orientation

Boat fishing is very popular at Lake Ouachita, especially in the Spring and Fall. The more popular areas include the areas near Crystal Springs, Joplin, Little Fir, and Twin Creek. Some conflicts occur between boat fishermen and boaters/waterskiers. "No wake" and "no ski" areas exist at some of the coves and standing timber was allowed to remain in most of the narrow inlets of the lake.

The remainder of the findings of this section are based on the User Survey. This survey obtained 23 responses from boat fishermen who were surveyed predominantly in the areas of the lake near Highway 27 and Little Fir areas.

User characteristics

Table 38 indicates the characteristics of the boat fishermen surveyed at Ouachita. The most significant differences in the characteristics of the boat fishermen who were surveyed at Ouachita from those of other project areas are: 1) the relatively greater proportion of older users, 2) the relatively fewer users from nearby locations, and 3) the relatively fewer number of users participating in no other activities or in four or more activities.

Table 38

Boat Fishermen Characteristics

Age	Percent of Boat Fishermen	Group Size	Percent of Boat Fishermen
<18	0	1	4
18 - 25	4**	2	57
26 - 40	30	3 - 4	26
41 - 55	26	5 - 8	13
56 - 65	22*	9 - 12	0
>65	17*	>12	0

Travel Time to Project Area	Percent of Boat Fishermen	Visit Duration	Percent of Boat Fishermen
<15 minutes	4**	1 - 4 hours	26
15 - 30 minutes	4**	5 - 8 hours	39
30 - 60 minutes	13**	1 day	0
1 - 2 hours	48	2 days	9
2 - 3 hours	26	3 days	9
3 - 5 hours	4	4 days	0
>5 hours	0	5 - 7 days	13
		>7 days	4

No. of Other Activities	Percent of Boat Fishermen	Equipment	Percent of Boat Fishermen
0	17**	Day sailer	0
1	17	Sailer (cabin)	0
2	52	Canoe	0
3	4	Row boat	0
4	0**	Power boat (<25 h.p.)	40
5	9**	Power boat (>25 h.p.)	60
6	0	Houseboat or cruiser	0
>6	0		

*Significantly higher than total survey sample.
**Significantly lower than total survey sample.

User opinions

Spacing preferences - Tables 39 and 40 indicate the spacing that the boat fishermen surveyed at Ouachita and elsewhere prefer.

Table 39

Preferred Distance Responses*

Sample	Sample Size	Range	Mean	Median	Mode
All Boat Fishermen Surveyed	111	30 - 5280	555	200	100
Ouachita	23	45 - 1320	345	200	150

*In feet; See Appendix A for definitions of terms.

Table 40

Preferred Distance Responses in Planning Range and Preference Groupings*

Sample	% in Planning Range[1] (50'-1500')	% in A[2] (50'-199')	% in B[2] (200'-599')	% in C[2] (600'-1500')
All Boat Fishermen Surveyed	91%	49%	27%	24%
Ouachita	91	43	33	24

*See Appendix A for definitions of terms; See Technical Report for a full development of spacing preference information.

[1]Percentage of all preferred distance responses.
[2]Percentage of all preferred distance responses in Planning Range.

Reasons for pleasant/unpleasant experience - Table 41 indicates the impact that different factors had on making the boat fishing experience pleasant or unpleasant for the users surveyed at Ouachita. Users found their experience to be generally pleasant. The amount, size, and type of fish being caught was the factor which was most frequently unpleasant. Tables 42 and 43 show the positive and negative changes reported by boat fishermen in the physical conditions and people's use of the area from their previous visit.

Table 42

Positive and Negative Changes Noticed in the Physical Conditions of the Area - Items Mentioned by Boat Fishermen

Area	Positive Changes	Negative Changes
Lake (and/or adjacent area)	"More picnic tables" (1) "Water high" (1) "Better and bigger boats being used" (1)	"Fishing bad" (8) "High water" (1) "Fewer trees" (1) "More ramps brought more boats" (1) "Less underwater cover" (1) "Put in big ramp at Little Fir" (1)

NOTE: The number in parenthesis (#) indicates the number of times the change was mentioned.

Table 43

Positive and Negative Changes Noticed in the People's Use of the Area - Items Mentioned by Boat Fishermen

Area	Positive Changes	Negative Changes
Lake (and/or adjacent area)	(None mentioned)	"Local people greedy" (1) "Crowded" (1) "Fewer fish" (1)

NOTE: The number in parenthesis (#) indicates the number of times the change was mentioned.

Table 41

Reasons Making Recreation Experience Pleasant or Unpleasant--Boat Fishing
Lake Ouachita

Reasons	Percentage* of Users Responding:		
	Pleasant	Unpleasant	Not Important
General Reasons			
Characteristics and behavior of other people	87	13	-
Distance from other people	92	4	4
Number of people in other visitor groups	91	-	9
Number and type of other activities occurring here	95	-	5
Scenic views	100	-	-
Noise	100	-	-
Accidents or near accidents	96	4	-
Enforcement of rules/regulations	95	5	-
Car parking facilities	100	-	-
Theft	100	-	-
Vandalism	95	-	-
Land-Based Reasons			
Visual privacy from other people	65	4	22
Amount of facilities (restrooms, water, etc.)	82	9	9
Convenience to facilities (restrooms, water, etc.)	87	4	9
Maintenance of facilities	100	-	-
Condition of trees and landscape	87	13	-
Condition of grass or soil	87	13	-
Water-Based Reasons			
Water quality	96	4	-
Catching fish	55	45	-
People in areas they shouldn't be	95	5	-

*Percentages may not total 100% because of those responding "Does Not Apply."

Acceptability of techniques - Table 44 indicates the acceptability of different techniques for solving problems to the boat fishermen surveyed at Ouachita.

The acceptability of some techniques is very clear: at least 60 percent of the respondents agreed on one of the 3 levels of acceptability for 7 of the 17 techniques. But even for those techniques which most respondents found to be acceptable, up to 48 percent found them to be unacceptable. Thus, project management should expect some opposition to any technique used.

Table 44

User Acceptability of Techniques--Boat Fishing
Lake Ouachita

Techniques	Levels of Acceptability Percentage* of Users Responding:		
	Very Acceptable	Mildly Acceptable	Unacceptable
General Planning Techniques			
Keep major recreation areas more separated	56	22	22
Make vehicle access to areas less convenient	4	22	74
Make area's existence less obvious	4	48	48
Site Planning Techniques			
Reduce number of parking spaces	26	30	44
Management Techniques			
Procedures:			
Require prior reservations	13	22	65
Require permits	22	39	39
Charge/increase fees	4	44	52
Rules and Regulations:			
Impose more rules	30	22	44
Provide stricter enforcement of rules	87	9	4
Close areas when natural resource destruction reaches critical point	63	27	10
Close areas when they become "too full"	26	35	39
Reduce number of activities in same area	36	36	28
Limit number of people in visitor groups	14	9	18
Keep unnecessary vehicles out	32	27	-
Services:			
Provide more and better information	70	17	13
Increase maintenance and restoration	83	13	4
Reduce facilities and services	13	13	74

*Percentages may not total 100% because of those responding "Does Not Apply."

PART 3: ANALYSIS OF SELECTED PROBLEMS/SITUATIONS

PART 3: ANALYSIS OF SELECTED PROBLEMS/SITUATIONS

This final section identifies and examines selected problems and situations at Lake Ouachita. The section is not intended to provide solutions to all project area problems. Nor is it a substitute for project area master planning. The solutions/techniques are intended to be only suggestions for further consideration by project area personnel, for they are most familiar with the intricacies associated with these problems.

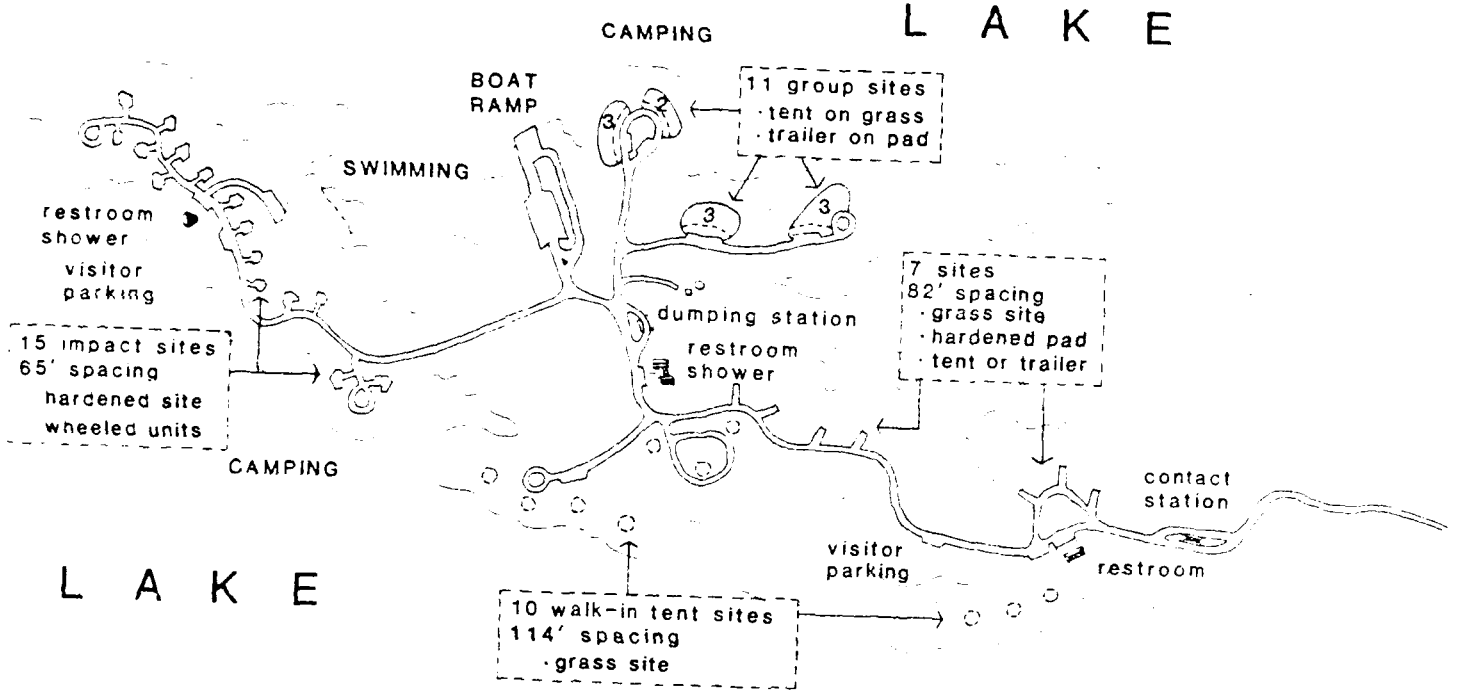
In many cases, the project area staff is already aware of these problems or situations and is in the process of dealing with them. And in some cases, the solutions/techniques listed in Table 45 may not be practical or possible because of management, budget, or other constraints.

Table 45

Analysis of Selected Problems/Situations

Area/Subject	Problem/Situation	Possible Solutions/Techniques
Crystal Springs & Joplin Recreation Areas	Overuse--The steep terrain & shallow soil are extremely susceptible to erosion. The steep slopes & narrow fingers make circulation difficult in Joplin. Overuse is evident at Joplin & Crystal Springs. Unlike at Brady Mt., reseeding, fertilizing & restoration efforts have met with marginal success at Joplin & Crystal Springs Recreation Areas because of the more random traffic movement.	• eliminate random traffic movement. • provide hardened pads (gravel or paved) camp pads or "impact sites." • continue reseeding/fertilizing with hydroseeder. • continue restoration efforts. • monitor use and, when necessary, close down areas or parts of areas until restored. • provide walk-in tenting areas in the more sensitive locations. • provide better site delineation.

Area/Subject	Problem/Situation	Possible Solutions/Techniques
		o evaluate reducing the number of campsites
		o determine the areas social and resource capacity & manage accordingly.
		o See Figures 1, 2 and 3 at the end of Part 3 which show example concept plans which might help solve overuse & overcrowding at Joplin Recreation Area if implemented. Special features are noted directly on each plan.
Crystal Springs & Joplin Recreation Areas	Overcrowding was observed & reported at both Joplin & Crystal Springs during the user surve.	o provide more information, directions, & signs to encourage recreators to use other project recreation areas.
		o separate camping and day use activities.
		o determine social capacity & close gate when areas get full.
		o provide better site delineation
		o provide open space corridors (like at Brady Mt.) along the lake shore
Brady Mountain	Some of the campers surveyed felt that "too many" sites were removed	o consider adding a few more sites when the occasion arises (e.g., old sites wear out)
	Some trailer campers complain about tenters usurping trailer spots.	o provide more separate locations for tent campers
	Overflow area is used on a fee basis, even when regular campground is not totally full.	o encourage campers to use other project area campgrounds, instead of overflow areas.
		o provide stricter enforcement (e.g., require overflow campers to move to regular sites as they become available)
Denby Point	Underuse--historically this recreation area has always been underused because of its comparatively remote location, trees (less security), wind conditions, situation away from lake.	o encourage more use through more directions, signs, & information
		o urge overflow campers at Joplin, Brady Mt., & Crystal Springs to use Denby Point.
		o monitor use levels & talk with campers about possible improvements

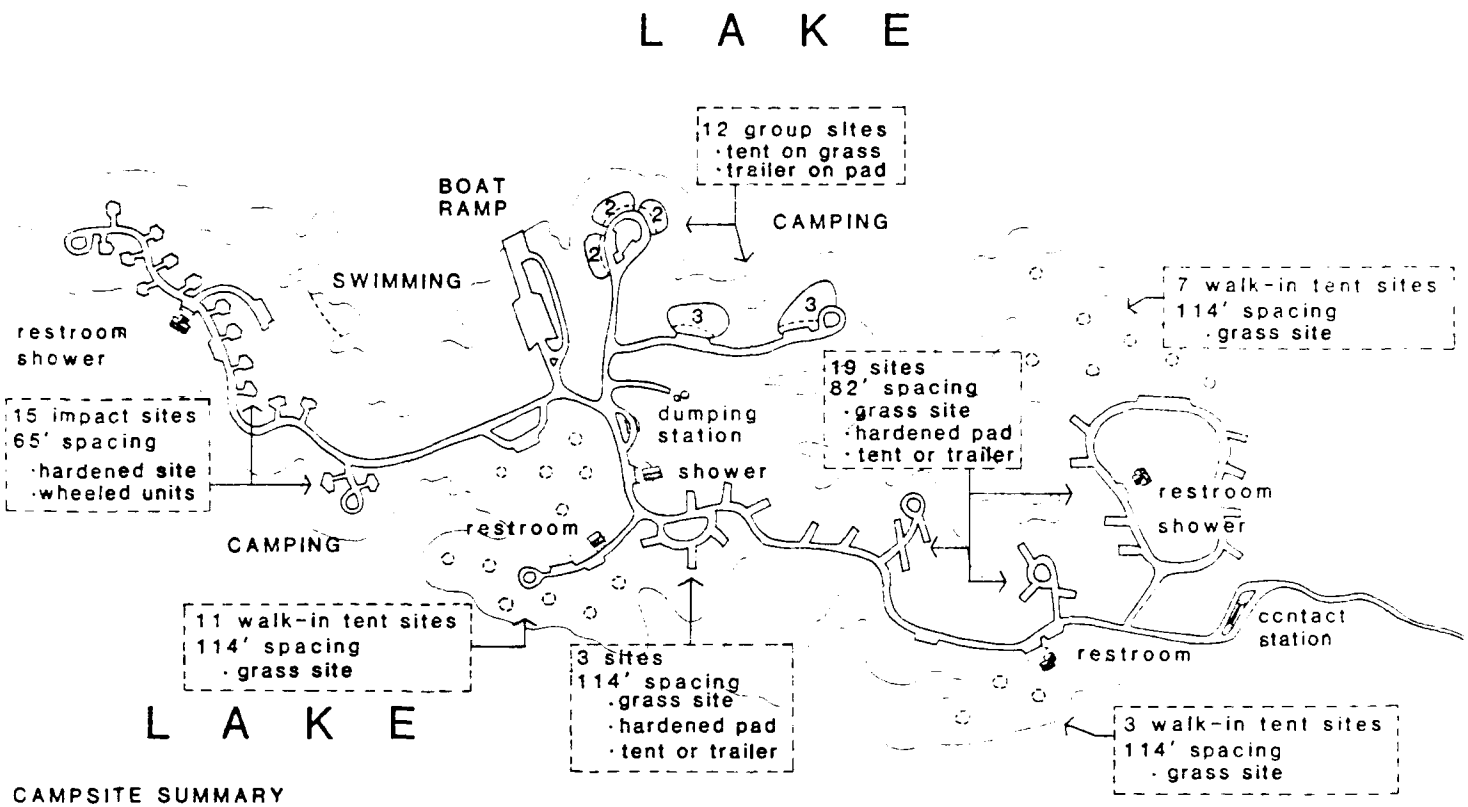


CAMPSITE SUMMARY

15 (35%) at 65' spacing - impact
7 (16%) at 82' spacing
10 (23%) at 114' spacing - walk-in tent
11 (26%) common pad - group

43 (100%)

Figure 1. Joplin Recreation Area, Plan 1

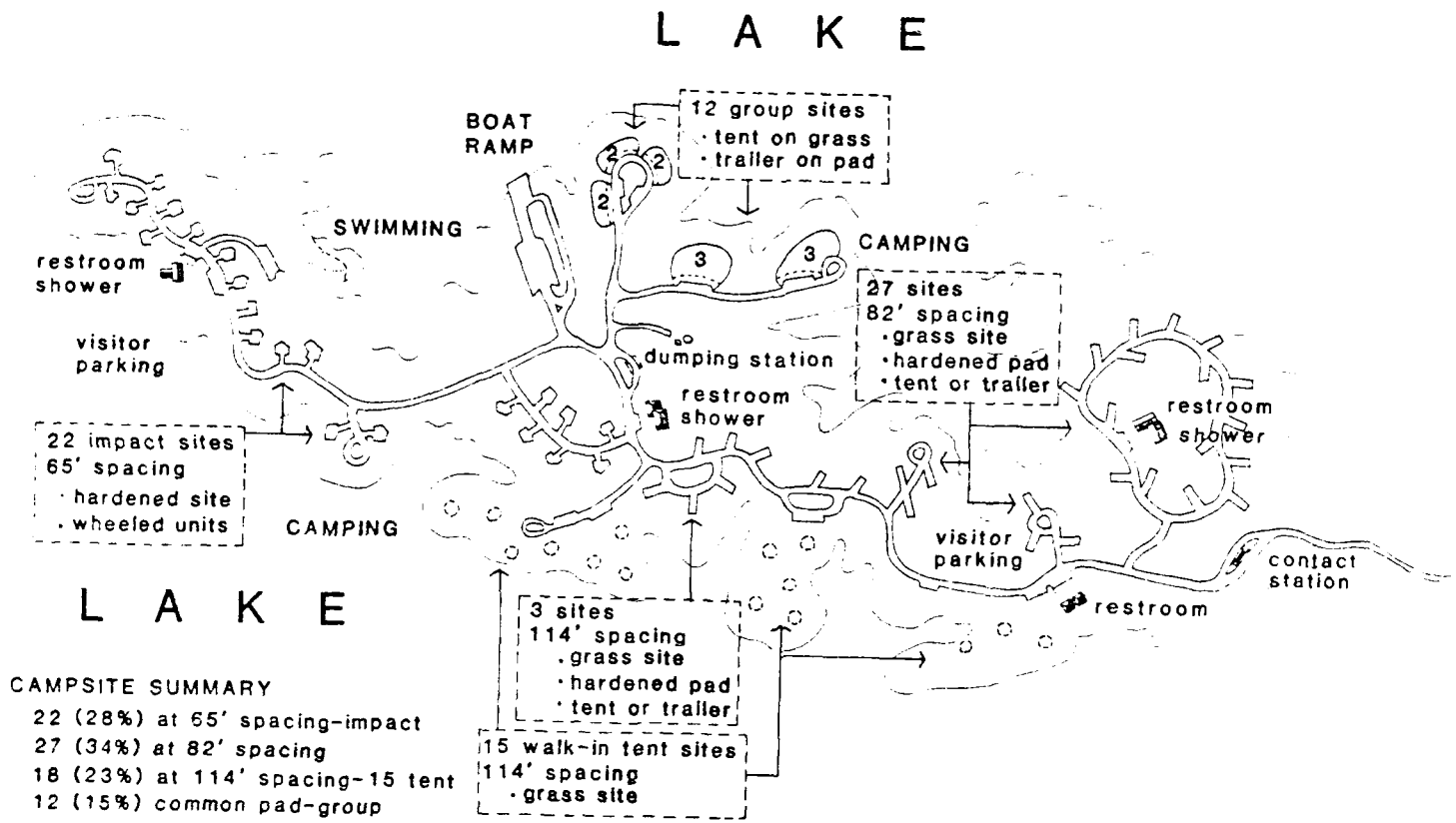


CAMPSITE SUMMARY

15 (21%) at 65' spacing - impact sites
19 (27%) at 82' spacing
24 (35%) at 114' spacing - 21 walk-in tent
12 (17%) common pad - group

70 (100%)

Figure 2. Joplin Recreation Area, Plan 2



CAMPSITE SUMMARY

22 (28%) at 65' spacing-impact
27 (34%) at 82' spacing
18 (23%) at 114' spacing-15 tent
12 (15%) common pad-group
79 (100%)

preferred distribution without group sites

22 (34%) at 65' spacing-impact
27 (40%) at 82' spacing
18 (26%) at 114' spacing-15 tent
67 (100%)

Figure 3. Joplin Recreation Area, Plan 3

Area/Subject	Problem/Situation	Possible Solutions/Techniques
		o provide more improvements (e.g. electric hookups?)
Crystal Springs Boat Launching Ramp	Overcrowding & congestion at boat ramps.	o designate parking spaces more formally
		o enforce parking regulations more strictly
		o add gate & close it when area gets full. Allow people in a people leave.
		o on holiday weekends provide ranger to direct traffic & circulation
		o See Figure 4, which demonstrates ways the carrying capacity at a launch ramp might be increased
Crystal Springs Beach/Campground	User Conflicts--were observed & reported between campers & users of the swimming beach.	o develop separate day use beach/area outside of campground
		o close gate when area gets "too full"
		o enforce parking regulations (none on grass or on campsites)
Crystal Springs overflow camping	Overflow leg--poorly developed. The few sites can only provide marginal usefulness when overflow occurs.	o re-examine costs & benefits of area; consider closing to allow vegetation to regrow & act as more effective buffer between camping area & launch ramp.
Lake	Conflicts between waterskiers & boat fishermen; boaters speeding too close to shore.	o continue to identify "no ski" and "no wake areas"
		o consider using floating "ski docks" to attract skiers to appropriate areas on the lake
		o encourage waterskiers & power boaters to stay a certain distance from shore (this may also reduce shoreline erosion)
		o provide more information to boaters, waterskiers & boat fishermen regarding this problem & their role in helping to achieve pleasant recreation experiences
		o provide strict enforcement of regulations

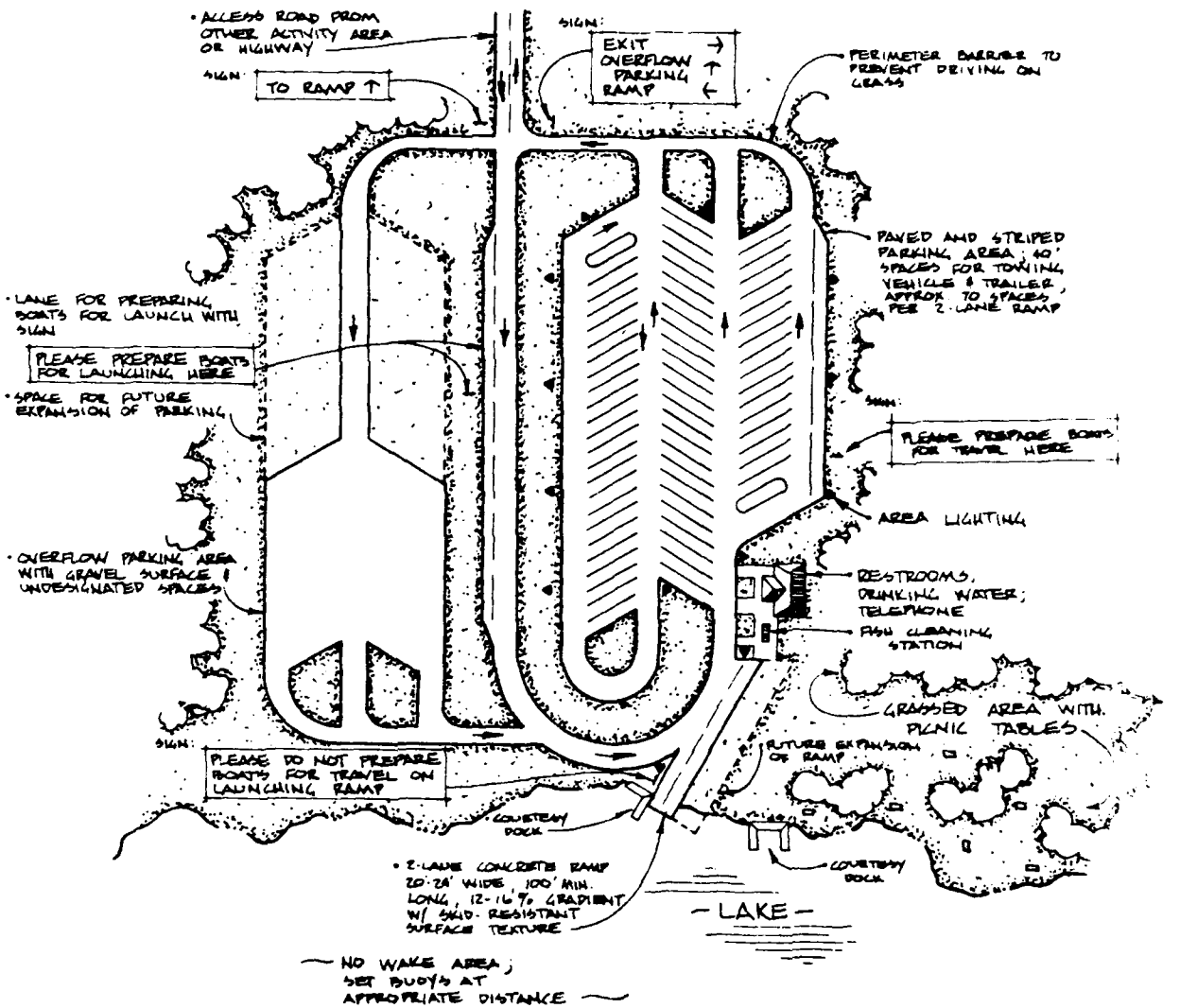

• ACCESS ROAD FROM OTHER ACTIVITY AREA OR HIGHWAY
SIGN: TO RAMP ↑
SIGN: EXIT OVERFLOW PARKING RAMP → ↑ ←
PERIMETER BARRIER TO PREVENT DRIVING ON GRASS
PAVED AND STRIPED PARKING AREA, 40' SPACES FOR TOWING VEHICLE & TRAILER, APPROX 10 SPACES PER 2-LANE RAMP
• LANE FOR PREPARING BOATS FOR LAUNCH WITH SIGN
PLEASE PREPARE BOATS FOR LAUNCHING HERE
• SPACE FOR FUTURE EXPANSION OF PARKING
SIGN: PLEASE PREPARE BOATS FOR TRAVEL HERE
AREA LIGHTING
• OVERFLOW PARKING AREA WITH GRAVEL SURFACE & UNDESIGNATED SPACES
RESTROOMS, DRINKING WATER, TELEPHONE
FISH CLEANING STATION
GRASSED AREA WITH PICNIC TABLES
SIGN: PLEASE DO NOT PREPARE BOATS FOR TRAVEL ON LAUNCHING RAMP
FUTURE EXPANSION OF RAMP
COURTESY DOCK
COURTESY DOCK
• 2-LANE CONCRETE RAMP 20'-24' WIDE, 100' MIN. LONG, 12-16% GRADIENT W/ SKID-RESISTANT SURFACE TEXTURE
— LAKE —
— NO WAKE AREA; SET BUOYS AT APPROPRIATE DISTANCE —

Figure 4

Area/Subject	Problem/Situation	Possible Solutions/Techniques
Lake	Underwater obstructions.	o continue to place warning buoys & identify obstructions.
Picnicking	Few areas are available for picnicking.	o examine the demand for picnicking at Lake Ouachita. o provide picnic areas at accessible locations closest to potential users. o provide for a variety of picnicking activities (e.g. family, small group, large groups).
Beaches	Few improved beaches are provided for swimming/sunbathing; erosion has been a problem at some of the beaches.	o provide more improved swimming areas at better locations. o provide separate beach areas for campers & day users o continue to maintain beaches, replenish sand, & divert drainage away from beaches
Hiking	During the User Survey, the three hiking trails appeared underused.	o provide more directional signs to the trails. o make more people aware of these trails o consider providing additional trails which link activity areas together.

APPENDICES

APPENDIX A: KEY TERMS

1. Activity area - The specific area where an individual primary activity occurs (e.g., a campground, the lake, a hiking trail, a picnic area, etc.).

2. Capacity, recreational carrying - The capability of a recreational resource to provide opportunity for certain types of satisfactory recreation experiences over time without significant degradation of the resource. Inherent in this view of carrying capacity are resource (biophysical) and social (psycho-social) capacities.

3. Capacity, resource - The level of recreational use of a resource beyond which irreversible biological deterioration takes place or degradation of the physical environment makes the resource no longer suitable or attractive for that recreational use.

4. Capacity, social - The level of recreational use of a resource or area beyond which the user's expectation of the experience is not realized and he/she does not achieve a reasonable level of satisfaction.

5. Carrying capacity guidelines - The levels of use and the methods used to obtain and achieve them which are recommended in this report.

6. Factors - The characteristics and phenomena which influence carrying capacity.

7. Indicators - The phenomena which can be used to identify or measure the degree of overcrowding or overuse, and which can be used in conjunction with a monitoring system to help predict when problems of overuse and overcrowding will occur if preventive measures are not taken.

8. Management/site survey - The initial survey conducted at the study project areas where resource managers, rangers, and maintenance personnel were interviewed and a reconnaissance was made of "overused," "overcrowded," "underused," and "well-balanced" recreation areas. (See Appendix B)

9. Mean - The measure of central value defined as the sum of all observations divided by the number of observations.

10. Median - The measure of central value defined as the point on the scale of observations which is the middle observation (if there is an odd number of cases) or which is the mean of the two central observations (if there is an even number of cases).

11. Mode - The measure of central value defined as the observation with the largest frequency.

12. Monitoring - The periodic assessment of the impact that use levels have on the social capacity or resource capacity of an area.

13. Overcrowding - A condition where the user does not achieve a satisfactory recreational experience because of too many people, inadequate distances between sites, etc.

14. Overuse - A condition where (during the course of a season/year) degradation of the physical environment makes the resource no longer suitable or attractive for recreational use.

15. Planning range - The range of spacing distances for an activity which satisfies the spacing preferences of the majority of recreators participating in that activity, which at the same time accounts for other considerations (e.g., cost, safety, equity, etc.).

16. Preference distribution - The set of preference groupings for an activity which can be modified to develop the social carrying capacity of an area.

17. Preference groupings - The range of spacing distances for an activity which satisfies the similar spacing preferences of a group of recreators participating in that activity.

18. Primary activity - The major recreation activity which brought the visitor to the recreation area.

19. Project area - The land and water area of the total Corps of Engineers Project.

20. Project management - The project area staff, district personnel, and other people involved with project area management.

21. Recreation area - Corps-managed areas specifically identified for recreational use within the total Project Boundary; usually named.

22. Recreation day - A standard unit of use consisting of a visit by one individual to a recreation development or area for recreation purposes during any reasonable portion or all of a 24-hour period.

23. Recreation environment - An activity area together with its various recreation settings.

24. Recreation resource - The land and/or water areas, with associated facilities, which provide a base for outdoor recreation activities.

25. Recreation setting - The physical, development/control, activity/use relationship components of an activity area; taken as a whole, the various settings comprise a particular "recreation environment" for each activity area.

26. Recreation unit - A campsite, picnic table, boat, off-road vehicle, user group, or other unit which when spaced together with other units represents a use level or density.

27. Representative recreation setting - The most typical recreation setting for a particular activity.

28. Secondary activities - Incidental activities; activities which are supplemental to the primary activity.

29. Study activity area - An activity area at which the management/site survey and the user survey was conducted.

30. Study project area - One of the 11 project areas at which the management/site survey and the user survey were conducted. These project areas are: Barkley Lock and Dam, Benbrook Lake, Hartwell Lake, McNary Lock and Dam, Milford Lake, New Hogan Lake, Lake Ouachita, Lake Shelbyville, Shenango River Lake, Somerville Lake, and Surry Mountain Lake.

31. Title 36 - Part 327, Chapter III, of Title 36 of the Code of Federal Regulations which provides rules and regulations governing the public use of water resource development projects administered by the Army Corps of Engineers.

32. Underuse - A condition where use levels are significantly less than their potential service level.

33. User survey - The survey that provided user preference information used in developing social capacity guidelines; information was obtained from users at the study project areas by means of a questionnaire (see Appendix B).

34. Well-balanced use - A condition which exhibits just the right amount of use to satisfy users and protect the resource.

APPENDIX B: EXAMPLE SURVEY FORMS

This Appendix includes on the following pages examples of the survey forms that were used during the Management/Site Survey and the User Survey.

MANAGEMENT/SITE SURVEY

PICNICKING QUESTIONNAIRE

(Resource Manager, Head Ranger, Maintenance Foreman)

Project Area Name _____

Respondent Name _____ Title _____

Interviewer _____ Date _____

1. PICNICKING USE AREA INFORMATION (selected areas)

Recreation Area/Use Area Names	Support Facilities	Fee Charged	Acres: Total Use Area	Acres: Activity Area Only	Total Picnic Sites	List Primary Activities Adjacent to Area	When Started
OVERCROWDED							
OVERUSED							
UNDERUSED							
WELL-BALANCED							

2. VISITOR CHARACTERISTICS RELATED TO OVERCROWDING/OVERUSE

Picnicking

Recreation Area/Use Area Names (same as in #1)	# of picnicking groups on typical recreation season weekend day	Typical Length of Stay	Typical Ages	Typical Group Size	Origin of visitors[1] % U	% S	% R	Approximate # of miles most visitors travel to use area High	Average	Average Frequency of visits per year
OVERCROWDED										
OVERUSED										
UNDERUSED										
WELL-BALANCED										

NOTES: [1]U = Urban location (city), S = Suburban location, R = Rural

3. CAUSES & EFFECTS OF OVERCROWDING/OVERUSE

Picnicking

Use Area Names (same as in #1 & #2)	Actual Complaints (list in order of frequency)	Causes		Effects	
		Observed	Surmised	Observed	Surmised
OVERCROWDED					
OVERUSED					
UNDERUSED					
WELL-BALANCED					

Picnicking

4. OCCURRENCE OF OVERUSE/DEGRADATION

Use areas which experience overuse (from #1)	Off-season restoration potential: Recovers naturally	Off-season restoration potential: Requires treatment	Off-season restoration potential: Beyond off-season restoration	Approximate Dates of Recreation season (_____ to _____)	When signs of degradation first occur: Approx. date	When signs of degradation first occur: Approx. visitor groups to date	When highest degradation is reached: Approx. date	When highest degradation is reached: Approx. visitor groups to date

5. INDICATORS (SIGNS) OF OVERCROWDING

Indicators	Assign relative importance using a numerical rating on a scale of 1 (least) to 10 (most)	Comments
o Increase in the # of complaints		
o Arguments/conflicts between picnickers		
o Shorter stays		
o Fewer returnees		
o Increase in crime		
o Increase in noise		
o Picnicking, in non-picnic areas		
o Crowded support facilities		
o Increase in litter		
o Increase in resource and facility destruction		
o Occurrence of displacement/succession (changes in visitor characteristics)		
o Increase in number of accidents involving vehicles		
o Increase in use levels		

(Please list others below)

o

o

o

6. INDICATORS OF OVERUSE/DEGRADATION

Indicators	Assign relative importance using a numerical rating on a scale of 1(least) to 10 (most)	Comments
o Ground cover wearing away		
o Damaged trees and/or undergrowth		
o Absence/change in wildlife		
o Increased erosion/sedimentation		
o Little deadfall		
o Compacted soils		
o Increased litter/trash		
o Trees cut down		
o Increased runoff		
o Need for replacement of support facilities before normal life period		
o Rodent infestation		

(Please list others below)

o

o

o

o

Picnicking

FACTORS AFFECTING RESOURCE CARRYING CAPACITY

Factors	Assign relative importance using a numerical rating on a scale of 1 (least) to 10 (most)	Comments
o Resiliency of vegetation type		
o Resiliency of soils		
o Resiliency of wildlife		
o Degree of normal maintenance applied		
o Degree of off-season restoration applied		
o Site drainage		
o Slope/topography		
o Climate/micro-climate		
o Group size		
o Slope orientation		
o Tree cover		
o Level of development (e.g. paved roads/paths vs. unpaved roads/paths)		

(Please list others below)

o

o

o

8. FACTORS AFFECTING SOCIAL CARRYING CAPACITY

Factors	Assign relative importance using a numerical rating on a scale of 1 (least) to 10 (most)	Comments
o Similarity of visitor groups		
o Slope orientation		
o Distance from highway access		
o Proximity to the water		
o Scenic views or vistas		
o Quality/variety of natural amenities		
o Number, type, and degree of man-made intrusions or disturbances (power lines, buildings, etc.)		
o Visual screening between picnickers		
o Density/type of vegetation		
o Distance between picnic sites		
o Degree of designation		
o Level of support facilities		
o Proximity to support facilities		
o Size of picnicking area		
o Charging of fees		
o Compatibility of nearby primary activities		
o Single purpose or multi-purpose recreation area		
o Distance traveled		
o Frequency of visits		
o Origin of user (urban, suburban, rural)		
o Configuration of area		
o Degree of maintenance		
(Please list other factors)		
o		
o		

9. PRESENT/PAST CAPACITY MANAGEMENT

Picnicking

Use areas where capacity management techniques were, or are now, applied (Name)	Past (√)	Present (√)	List capacity management techniques(s) used	Describe level of effectiveness (pros/cons regarding visitor satisfaction and resource protection)	Assessment of management feasibility (pros/cons why the technique could or could not be implemented)

Ofs

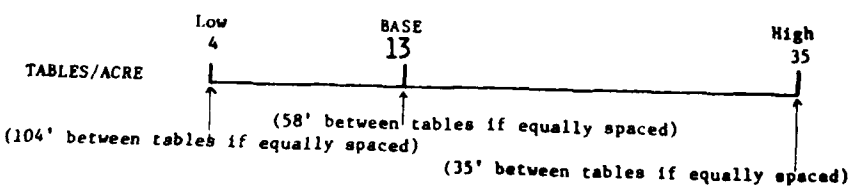
10. POSSIBLE CARRYING CAPACITIES

Picnicking

Use Area Names	Present capacity actual or estimated	Best guess as to what the capacity should be	Principal factors
THE MOST OVERCROWDED AREA:			
THE MOST OVERUSED AREA:			
THE MOST UNDERUSED AREA:			
THE MOST WELL-BALANCED AREA:			

EXAMPLES FROM BUREAU OF OUTDOOR RECREATION CAPACITY RESEARCH:

(Use as a general guide when estimating what the capacity should be)



MANAGEMENT/SITE SURVEY

CAMPING

USE AREA ANALYSIS SHEET

(for URDC staff use)

Project Area Name _____ Field Analyst(s) _____

Recreation Area and/or Use Area _____ _____

_____ Weather _____

Code # _____ Date _____

				ANSWER COLUMN	COMMENT CODE	COMMENTS:
SITE AWARENESS	Signage (camping or name)	Between main highway and use area entrance				
		At use area entrance				
	Exposure of Site	Between main highway and use area entrance				
		At use area entrance				
	Relationship to Main Highway	Distance to area from main highway				
SITE ACCESS	Road Conditions	Road to site from main highway				
			Paved(P) or Unpaved(U)			
			Condition (E, G, P)			
			Estimated Width			
		Road within use area				
			Paved(P) or Unpaved(U)			
			Condition (E, G, P)			
			Estimated Width			
		Presence of informal roads				
SLOPES & VEGETATION	Slopes	% of area 0 - 5%				
		% of area 6 - 9%				
		% of area 10%+				
		Existence of unique land form				
	Vegetation	Density of trees				
			% dense			
			% moderate			
			% sparse			
			% little or none			
		Density of understory				
			% dense			
			% moderate			
			% sparse			
			% little or none			
	On the Use Area	Geologic, cultural, archeologic features				
		Abundance of wildlife				
		Water feature				

NATURAL AMENITIES	From the Use Area	Visibility to water (Insert) O - outstanding	Severely obstructed		
			Moderately obstructed		
		G - good	Mildly obstructed		
		U - undesirable	Unobstructed		
		Visibility to other natural areas (Insert) O - outstanding	Severely obstructed		
			Moderately obstructed		
		G - good	Mildly obstructed		
		U - undesirable	Unobstructed		
		Distance to lake			
CONDITION OF NATURAL FEATURES	Vegetation & Soils	Dead or trampled vegetation			
		Evidence of taking			
		Compacted soils			
	Drainage	Wet soils/standing water			
		Erosion			
FACILITIES & SERVICES	Facility/ Service Distribution (S - Site D-Distributed C - Centralized)	Electric hook-ups			
		Water hook-up			
		Improved pad			
		Picnic tables			
		Cooking grill			
		Firewood			
		Drinking water (cold)			
		Hot water			
		Showers			
		Flush toilets			
		Vault toilets			
		Pit toilets			
		Dumping station			
		Shelter			
		First aid station			
		Telephone			
		Lighting (R - road, P - Parking W - Walkway, C - Comfort area			
		Recreation area or equipment			
		Convenience store			
	Condition	Excellent			
		Good			
		Need attention			
PLANNING DESIGN	Distance between campsites	Minimum			
		Maximum			
		Average			
	Distance between campsites and the facilities	Minimum			
		Maximum			
		Average			
	Space for camper unit maneuverability	Ample			
		Acceptable			
		Restrictive			
[illegible]	[illegible] control	[illegible] controlled (gate, attendant)			

Camping

	Car Parking	Parking space on each campsite		
		Road parking		
	Buffer between Campsites	Man-made		
		Natural vegetation		
		Planted landscape		
		None		

RELATIONSHIP OF CAMPING USE AREA TO OTHER USE AREAS

Use Area Name	Activity	Estimated direct distance from camping use area	Pedestrian accessibility to other use area: Easy	Moderate	Difficult	Visibility to other use area: Obstructed	Semi-obstructed	Unobstructed	Reasons for accessibility and/or visibility situation

ANALYST'S PERCEPTION OF ACTIVITY AREA'S CARRYING CAPACITY

List the resource/physical factors you feel most affect carrying capacity on this site

_____

_____

_____

_____

_____

Should resource/physical carrying capacity of this site be: _____ higher _____ lower _____ same

List possible techniques which might be used to increase and/or to limit capacity on this site.

_____

_____

_____

CORPS OF ENGINEERS USER CAPACITY SURVEY

Notations ☐

Date _____ Day _____ OMB Clearance # 49-R0419

Time (hour) _____ Expires October 1983

Weather _____ Project Area Name _____

Interviewer _____ Recreation Area Name _____

Activity _____ Code _____ Activity Area _____ Code _____

We are conducting a survey for the Army Corps of Engineers at selected Corps recreation areas throughout the Country. Through these surveys, we will discover how visitors feel about overcrowding and overuse of these recreation areas. The Corps will use this information to help make decisions about the use and protection of its recreation areas. Would you be willing to take fifteen minutes of your time to answer some questions about your visit here?

BASIC VISITOR CHARACTERISTICS

1. In which category is your age?

17 & under	☐
18 - 25	☐
26 - 40	☐
41 - 55	☐
56 - 65	☐
66 & over	☐

2. How large is your group?

1	☐
2	☐
3- 4	☐
5- 8	☐
9-12	☐
13+	☐

3. Is this your main destination or a stopover on a trip?

Main destination	☐
Stopover on trip	☐

4. How long did it take you to travel here from your home ___(✓) or last destination ___(✓)?

Under 15 minutes	☐
15-30 minutes	☐
30 min. - 1 hour	☐
1 - 2 hours	☐
2 - 3 hours	☐
3 - 5 hours	☐
5+ hours	☐

VISITOR PARTICIPATION

5. How many times did you participate in this activity anywhere last year? (if "0", go to Question 7)

0	☐
1 - 5	☐
6 - 10	☐
11 - 20	☐
21 - 30	☐
31+	☐

6. How many times have you participated in this activity at this Lake?

a) Last year?		b) So far this year?	
0	☐	0	☐
1- 2	☐	1- 2	☐
3- 4	☐	3- 4	☐
5- 7	☐	5- 7	☐
8-10	☐	8-10	☐
11-19	☐	11-19	☐
20+	☐	20+	☐

7. How long are you staying on this visit?

1 - 4 hours	☐
5 - 8 hours	☐
1 day (overnight)	☐
2 days	☐
3 days	☐
4 days	☐
5 - 7 days	☐
8 or more days	☐

8. Have you participated in this activity at this specific location anytime before this visit?

No ☐ (go to #9) Yes ☐ Please list any changes you have noticed in the physical condition of this location or in people's use of the area.

Physical condition:	People's use of the area:
☐ Positive	☐ Positive
☐ Negative	☐ Negative

9. Would you say the number of people who are now participating in this activity are:

too many ☐ too few ☐ just the right number ☐

10. a) Would you say that the distance between you and other people is:

too far ☐ (go 10d) just right ☐ (go 10e) too close ☐

(Actual or estimated distance to be recorded by interviewer _____)

b) If other people are too close, how far away would you like them to be? ☐ Not Applicable

just a little farther ☐ twice as far ☐ three times farther ☐ more than 3 times ☐

c) What is the closest distance you would accept? _____

d) What distance would you like them to be? _____

11. a) Which of the following reasons are making your present activity at this location pleasant or unpleasant?

	Pleasant	Un-pleasant	Not Important	Does Not Apply
GENERAL REASONS				
1. Characteristics and behavior of other people.	☐	☐	☐	☐
2. Distance from other people	☐	☐	☐	☐
3. Number of people in other visitor groups.	☐	☐	☐	☐
4. Number and type of other activities occurring here	☐	☐	☐	☐
5. Fees charged.	☐	☐	☐	☐
6. Scenic views	☐	☐	☐	☐
7. Noise	☐	☐	☐	☐
8. Accidents or near accidents	☐	☐	☐	☐
9. Enforcement of rules/regulations.	☐	☐	☐	☐
10. Car parking facilities	☐	☐	☐	☐
11. Theft	☐	☐	☐	☐
12. Vandalism	☐	☐	☐	☐
Others _____	☐	☐	☐	☐
_____				
LAND-BASED REASONS				
13. Trees/natural landscape	☐	☐	☐	☐
14. Visual privacy from other people	☐	☐	☐	☐
15. Amount of facilities (restrooms, water, etc.)	☐	☐	☐	☐
16. Convenience to facilities (restrooms, water, etc.)	☐	☐	☐	☐
17. Nearness to the water body.	☐	☐	☐	☐
18. Steepness of slopes	☐	☐	☐	☐
19. Maintenance of facilities	☐	☐	☐	☐
20. Condition of trees and landscape	☐	☐	☐	☐
21. Condition of grass or soil.	☐	☐	☐	☐
Others _____	☐	☐	☐	☐
_____	☐	☐	☐	☐
_____	☐	☐	☐	☐
WATER-BASED REASONS				
22. Water quality	☐	☐	☐	☐
23. Catching fish	☐	☐	☐	☐
24. Formal designation of places for your activity.	☐	☐	☐	☐
25. Waiting time to launch boat	☐	☐	☐	☐
26. Waiting time to retrieve boat	☐	☐	☐	☐
27. People in areas they shouldn't be	☐	☐	☐	☐
Others _____	☐	☐	☐	☐
_____	☐	☐	☐	☐
_____	☐	☐	☐	☐

b) Will any of the above reasons prevent you from coming here again?

No ☐ Yes ☐

If yes, which reasons (selected from reasons checked "unpleasant" above)?

_____

12. If recreation areas have too many people for each to enjoy the activity or if areas become damaged by too much use, there are some solutions for reducing that overcrowding or overuse. Please indicate which of the following possible solutions you would find very acceptable, mildly acceptable, or unacceptable for reducing crowding and/or natural resource destruction in this location. (If this location is not overcrowded or overused, assume that it is for this question.)

POSSIBLE SOLUTIONS FOR OVERCROWDING OR OVERUSE	Very Acceptable	Mildly Acceptable	Unacceptable	Does Not Apply
PUBLIC AWARENESS/EASE OF ACCESS SOLUTIONS				
1. Make vehicle access to areas less convenient.	☐	☐	☐	☐
2. Make the area's existence less obvious to the general public (fewer signs and directions)	☐	☐	☐	☐
3. Provide more and better information on how to use the area	☐	☐	☐	☐
ACTIVITY RELATIONSHIPS & USE DENSITY				
4. Keep major recreation activities more separated from one another.	☐	☐	☐	☐
5. Reduce the number of different activities occurring in the same area	☐	☐	☐	☐
6. Design for greater distance between people	☐	☐	☐	☐
7. Limit the number of people in each group	☐	☐	☐	☐
8. Change natural surfaces by hardening them to withstand more use.	☐	☐	☐	☐
9. Increase maintenance and restoration to allow more use	☐	☐	☐	☐
PLANNING & DESIGN SOLUTIONS				
10. Reduce the type and number of facilities and services provided	☐	☐	☐	☐
11. Keep unnecessary vehicles out of areas	☐	☐	☐	☐
12. Reduce number of parking spaces to limit number of users	☐	☐	☐	☐
13. Provide landscaped buffers between visitor groups to increase privacy	☐	☐	☐	☐
14. Redesign area to accommodate fewer users	☐	☐	☐	☐
RULES & REGULATIONS SOLUTIONS				
15. Have stricter enforcement of regulations	☐	☐	☐	☐
16. Impose more rules and regulations	☐	☐	☐	☐
17. Require prior reservations to use areas.	☐	☐	☐	☐
18. Require permits to use areas	☐	☐	☐	☐
19. Close down areas when natural resource destruction reaches critical point	☐	☐	☐	☐
20. Charge fees or increase fees now charged	☐	☐	☐	☐
21. Close gates when areas get "too full".	☐	☐	☐	☐
OTHERS				
_____	☐	☐	☐	☐
_____	☐	☐	☐	☐
_____	☐	☐	☐	☐
_____	☐	☐	☐	☐

11. Please answer the following questions about your other recreation activities on this visit.

	a) What are your other recreation activities on this visit?	b) Are they within walking distance or driving distance from this location? (use launching location for boat activities) (1) Walking distance	(2) Driving distance	c) What is your main recreation activity on this visit?
1.	Camping	☐	☐	☐
2.	Boating	☐	☐	☐
3.	Waterskiing	☐	☐	☐
4.	Swimming	☐	☐	☐
5.	Sunbathing	☐	☐	☐
6.	Picnicking	☐	☐	☐
7.	Shoreline fishing	☐	☐	☐
8.	Boat fishing	☐	☐	☐
9.	Biking	☐	☐	☐
10.	Horseback riding	☐	☐	☐
11.	Off-road vehicle riding	☐	☐	☐
12.	_____	☐	☐	☐
13.	_____	☐	☐	☐
14.	_____	☐	☐	☐
15.	_____	☐	☐	☐
16.	None	☐	☐	☐

RECREATION EQUIPMENT RECORD

Camping

- ☐ Tent
- ☐ Tent camper
- ☐ Truck-mounted camper
- ☐ Travel trailer
- ☐ Van
- ☐ Motor home
- ☐ _____
- ☐ _____

Boat Activities

- ☐ Day sailer
- ☐ Sailer (cabin)
- ☐ Canoe
- ☐ Row boat
- ☐ Power boat (less than 25 hp)
- ☐ Power boat (25+ hp)
- ☐ Houseboat or cruiser
- ☐ _____
- ☐ _____

Off-Road Vehicle Riding

- ☐ Trail bike
- ☐ Motorcycle
- ☐ ATV
- ☐ Dune buggy
- ☐ 4-wheel drive
- ☐ _____
- ☐ _____

COMMENTS:

REPLACEMENT QUESTIONS TO ASK DURING BOAT LAUNCHING INTERVIEWS

(Write answers and comments directly on the User Survey Interview Sheet)

10. a) Would you say that the time it takes you to launch your boat at this ramp is:

too long ☐ long, but tolerable ☐ just right ☐

(Approximately how long does it take to launch your boat at this ramp? Actual or estimated time to be recorded by interviewer _____)

b) How long would you prefer it to take:

just a little faster ☐ twice as fast ☐ three times faster ☐ more than three times faster ☐

c) What could be done to expedite boat launching at this ramp:

_____

_____

_____

AD-A090 599 URBAN RESEARCH AND DEVELOPMENT CORP BETHLEHEM PA F/G 13/2
RECREATION CARRYING CAPACITY FACTS AND CONSIDERATIONS. REPORT 4--ETC(U)
JUL 80 DACW39-78-C-0096
UNCLASSIFIED WES-MP-R-80-1-4 NL

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APPENDIX C: PROJECT AREA DESCRIPTION

Location

Lake Ouachita (Vicksburg District) is located on the Ouachita River in West Central Arkansas. The dam and powerhouse are situated 13 miles northwest of Hot Springs, Arkansas.

Authorization and purpose

The Blakely Mountain Dam and Reservoir was authorized by the Flood Control Act of 1944 for the purposes of flood control and hydroelectric power generation.

Project area size and features

The drainage area above the dam is 1105 square miles. At the average recreational pool elevation of 578 feet msl, the lake has a surface area of 40,060 acres and a 690-mile shoreline. Project land acreage at this elevation is 42,313 acres. Total project land and water acreage amounts to 82,373 acres. Fluctuation of the water level during the summer recreation season may be as great as eight feet.

Corps personnel assigned to the project area include a Resource Manager, two full-time rangers, and clerical and maintenance personnel. Additional rangers are hired on a temporary basis during the summer recreation season.

Topography

The reservoir lies within the Ouachita Mountains, and the topography of the land surrounding the lake ranges from hilly to rugged. Well-defined ridges range in elevation up to 1250 feet msl on the southern shore. The northern shore is less rugged. Water courses flow generally northerly or southerly toward the lake.

Climate

The climate of the region is characterized by short moderate winters and long summers. Normal temperatures range from the mid-90 degrees F. (with extremes to 110 degrees F.) in summer to the mid-30 degrees F. (with extremes to -10 degrees F.) in the winter. Average annual temperature is 62 degrees F. Prevailing winds are from the south-

west at about eight mph. The average rainfall is approximately 51 inches, with an average of six inches of snow. Precipitation is well distributed throughout the year and is ample for plant growth. The days are sunny 65 percent of the year, although 75 percent of the days are sunny during the summer.

Soils and vegetation

Soils in the area are shallow, and are composed of gravelly and sandy clay loams generally underlain by shale. The steep terrain of the area makes the shallow soil especially susceptible to erosion.

The area is forested with a heavy second-growth mixture of pine-hardwoods, with the shortleaf pine being the predominant species. Hardwoods include a mixture of oaks, sweet gum, blackgum, and hickory. Greenbrier, French mulberry, strawberry bush, and huckleberry are also scattered throughout the project area.

Fish and wildlife

The lake has provided excellent sport fishing, with largemouth, smallmouth, and spotted bass, black crappie, bluegill, redear and longear sunfish, and walleye as the major game species. The reservoir lands support game animals including gray and fox squirrels, wild turkey, and whitetail deer. Bobwhite quail, mourning doves, and rabbit are also present near areas of cultivation. Several pairs of bald eagles nest on project lands each year, and their number is increasing.

Population areas served and accessibility

Approximately 2.8 million persons live within 150 miles of the lake.

Access to the more developed, southern portions of the lake is provided by State and county roads leading from U. S. 270. State Route 298 provides access to the northern shore, and State Route 37 provides access to the western shore. The eastern shore is accessible at two locations (the damsite and at Ouachita State Park) via State Route 227.

Recreation areas

Recreation areas are distributed around the entire lake. However, because the southern shore of the lake has better access, it has more developed recreation areas than the northern shore. The Corps presently has 15 developed recreation areas, two primitive areas, and one wilderness area. These areas occupy over 2000 acres. Corps-developed sites generally provide areas for camping, boat launching, and picnicking, as well as comfort facilities. Swimming areas and group picnic shelters are provided at several areas. Ouachita State Park, on the eastern shore of the lake, offers a marina and restaurant, picnicking, camping, cabins, and a variety of naturalist programs on 370 acres.

Commercial concessionaires lease 236 acres from the Corps at nine of the developed recreational sites. Facilities provided by commercial concessions include housekeeping cabins, motel rooms, transient trailer spaces, boat docks and rentals, boat slips, launching ramps, eating establishments, and grocery or general supply stores.

Visitation

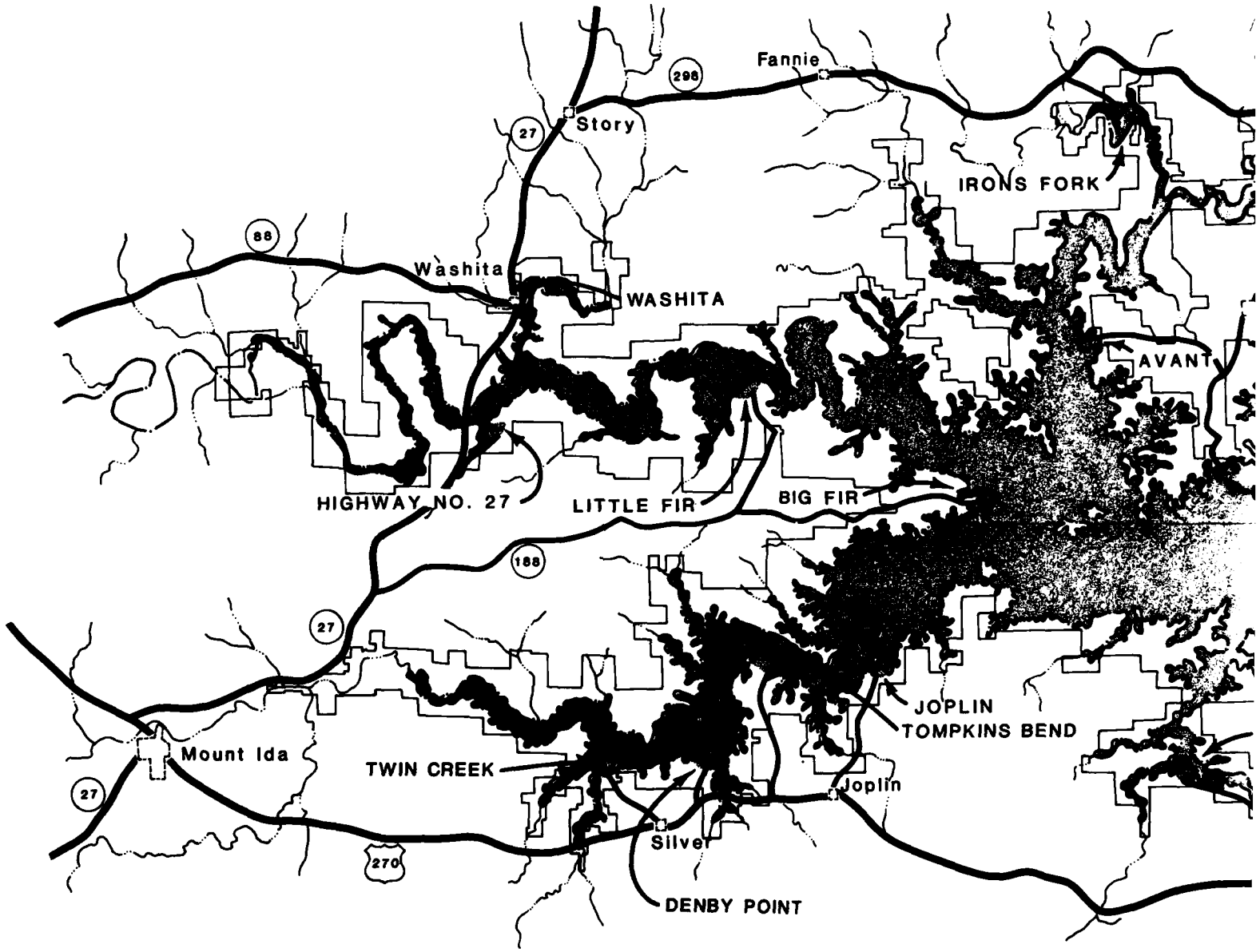
In 1978, 2,960,400 recreation days were reported at Lake Ouachita; highest visitation occurs during the months of May, June, and July.

In accordance with letter from DAEN-RDC, DAEN-ASI dated 22 July 1977, Subject: Facsimile Catalog Cards for Laboratory Technical Publications, a facsimile catalog card in Library of Congress MARC format is reproduced below.

Urban Research & Development Corporation.
Recreation carrying capacity facts and considerations; Report 4: Lake Ouachita Project Area / by Urban Research and Development Corporation, Bethlehem, Pa. Vicksburg, Miss. : U. S. Waterways Experiment Station ; Springfield, Va. : available from National Technical Information Service, 1980.
iv, 77, [25] p. : ill. ; 27 cm. (Miscellaneous paper - U. S. Army Engineer Waterways Experiment Station ; R-80-1, Report 4)
Prepared for Office, Chief of Engineers, U. S. Army, Washington, D. C., under Contract No. DACW39-78-C-0096.
Project map of Lake Ouachita in pocket at end of report.

1. Recreation carrying capacity. 2. Resource capacity. 3. Social capacity. 4. Activity area. 5. Factors. 6. Indicators. 7. Monitoring. 8. Overcrowding. 9. Overuse. 10. Recreation resource. 11. Underuse. 12. Well-balanced use. I. United States. Army. Corps of Engineers. II. Series: United States. Waterways Experiment Station, Vicksburg, Miss. Miscellaneous paper ; R-80-1, Report 4.
TA7.W34m no.R-80-1 Report 4

Lake Ouachita



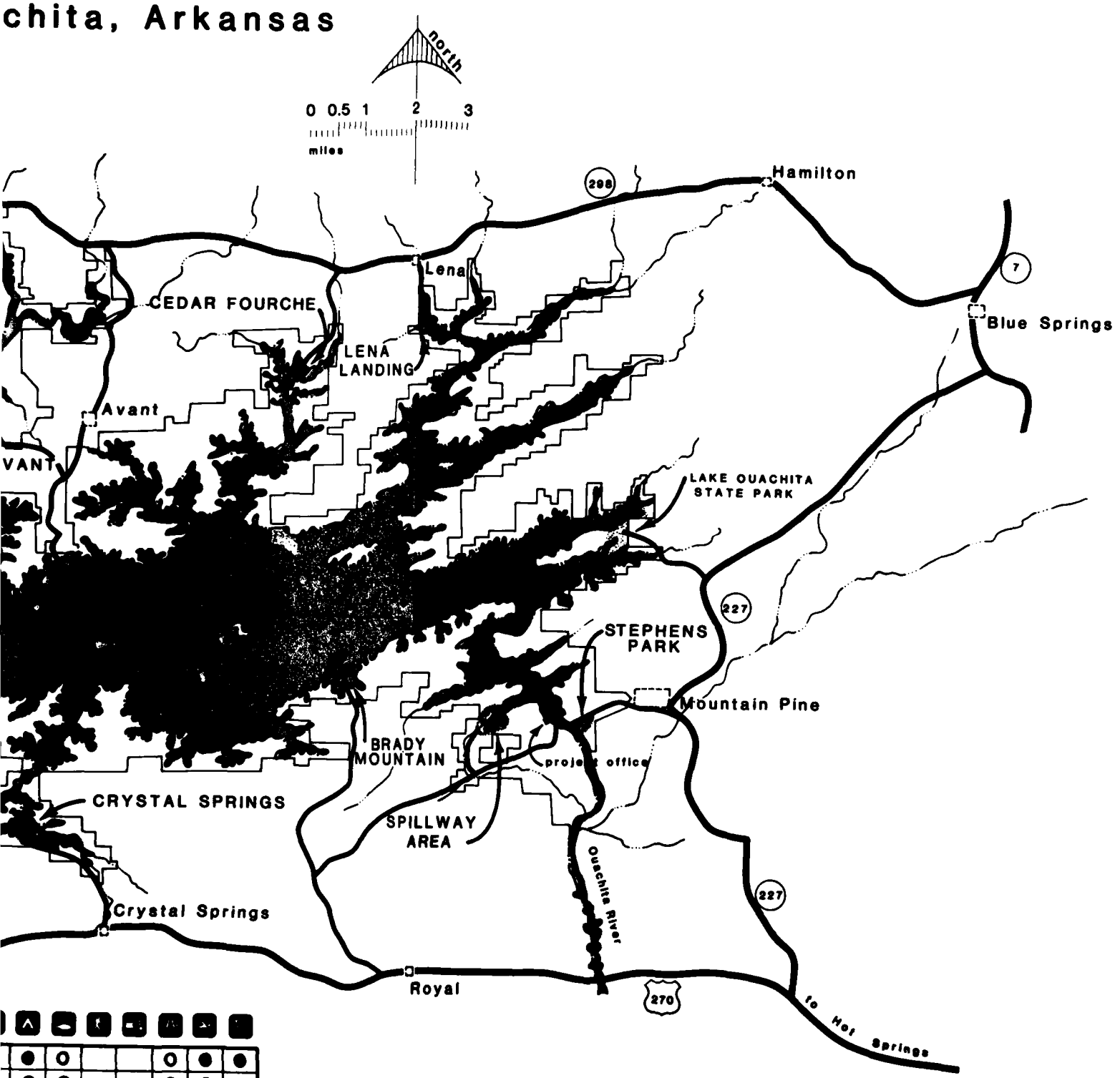
CORPS OF ENGINEERS RECREATION AREAS					
BRADY MOUNTAIN	O	●	●	●	O
CRYSTAL SPRINGS	●	●	●	●	O
JOPLIN	●	O	●		O
LAKE OUACHITA	O				●
SPILLWAY	O	O			O

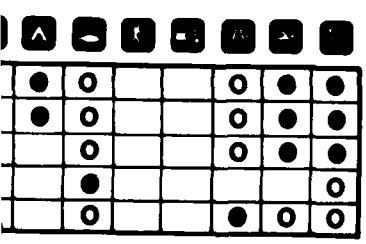
Corps recreation area
other recreation area
government-owned land
municipal boundary
dam
lake shoreline
highway
secondary road

prepared by Urban Research and Development Corporation - Bethlehem, Pa.

O denotes activity offered in re
● denotes interviews conducte

chita, Arkansas





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nducted in activity area